Analysis of Brownfield Cleanup Alternatives (ABCA)

Schovaers Electronics
22 South Jeremy Street
Salt Lake City, Utah

EPA Cooperative Agreement No. 96835701
EPA ACRES Property ID #199723
December 31, 2018

Terracon Project No. 61177082 Task P

Prepared for:
Salt Lake County
Salt Lake County, Utah

Prepared by:
Terracon Consultants, Inc.
Salt Lake City, Utah

December 31, 2018

Salt Lake County
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P.O. Box 144575
Salt Lake City, Utah 84114-4575

Attn: Mr. Ruedigar Matthes
P: (385) 468-4868
E: rmatthes@slco.org

Re: Analysis of Brownfield Cleanup Alternatives (ABCA)
Schovaers Electronics
22 South Jeremy Street
Salt Lake City, Utah
Terracon Project No. 61177082 Task P

Dear Mr. Matthes:

Terracon Consultants, Inc. (Terracon) presents to Salt Lake County this Analysis of Brownfield Cleanup Alternatives (ABCA) as part of cleanup design for the above-referenced Site. This cleanup design activity was performed consistent with Terracon's *Bid Proposal, Qualified Environmental Professional (QEP), Salt Lake County Community-wide Brownfields Assessment Grant, Spy Hop, Schovaers Electronics, and Heritage Forge*, dated December 1, 2017 (Terracon Proposal # P61177654), which was approved via electronic mail by Salt Lake County on December 5, 2017.

In the event a Brownfields Cleanup Grant is sought to assist with cleanup of the Site, funding guidance requires the applicant to provide the community with notice of its intent to apply for an EPA brownfields cleanup grant and allow the community an opportunity to comment on the draft proposal. In addition, the EPA Brownfield Cleanup funding proposal must include, as an attachment, a draft ABCA that summarizes information about the Site and contamination issues, cleanup standards, applicable laws, cleanup alternatives considered, and the proposed cleanup.

The ABCA must include information on the effectiveness, the ability of the grantee to implement each alternative, the cost of each proposed cleanup alternative and an analysis of the reasonableness of the various cleanup alternatives considered, including the one chosen. The ABCA is intended as a brief preliminary document summarizing the larger and more detailed technical and financial evaluations performed in addressing each of these areas. The ABCA may be modified technically and financially or in more depth relative to each of these areas upon award of funding and in response to community interaction.

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Terracon

Cleanup alternatives were evaluated in accordance with EPA protocols and general guidance required prior to implementation of a cleanup design using EPA Brownfields Grant funding. More specifically, this ABCA summarizes viable cleanup alternatives based on Site-specific conditions, technical feasibility and preliminary cost/benefit analyses. Specific cleanup alternatives and associated recommendations are presented in the applicable sections of this report.

Terracon appreciates this opportunity to continue to provide environmental consulting services for Salt Lake County in support of Brownfields redevelopment. Should you have any questions or require additional information, please do not hesitate to contact our office at (801) 545-8500.

Sincerely,
Terracon Consultants, Inc.

FOR

Curt A. Stripeika
Senior Project Manager

FOR

Benjamin B. Bowers
Environmental Department Manager

Andy King
Authorized Project Reviewer

Terracon

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APPENDICES

1.0 INTRODUCTION AND BACKGROUND

Terracon Consultants, Inc. (Terracon) has prepared this Analysis of Brownfield Cleanup Alternatives (ABCA) on behalf of Salt Lake County for the Schovaers Electronics Facility, which comprises a single parcel addressed as 22 South Jeremy Street (0.34 acres; Salt Lake County Parcel No. 15-02-204-007) and owned by Party of Six, LLC (the "Site"). An approximately 6,000-square-foot industrial building occupies the Site, and an approximately 672-square-foot garage is present on the northwest side of the Site.

The Site was residential from 1898 (or before) until the mid-1940s. The residences were demolished by the late 1940s and the current commercial building was constructed in 1956. The site building was originally occupied by an electrical supply company and then a wholesale upholstery business before Schovaers occupied the building in 1977. The Site operated as Schovaers until April 2017, and now the site is vacant. **Figure 1** below shows the Site parcel boundaries, Site layout, and surrounding properties with an aerial photograph.

The property to the north was undeveloped in 1898. By 1911 the property was residential and remained until the 1960s. Crown Plating has occupied the property since 1965 to the current day. To the east was Jeremy Street, followed by undeveloped land from at least 1898 to the 1950s. By 1958 the current building was visible to the northeast and used by Greater Mountain Chemical Company of Utah from at least 1962 to 1972, a soap company in 1977, Creed Laboratories in 1982, Chembrite in the 1990s, and Heritage Forge from at least 2009 to present. The properties to the south were residential from at least 1898. By 1911 a railroad line was present, followed by residences. In 1962 a janitorial supply company was listed, a laundry parts repair was listed in the 1970s to 1990s, and then the property appears to have been used as auto repair since the 1990s. The west adjoining property was residential from at least 1898 to 1911. By 1937 the residences were demolished, and the property was vacant until the current structure was built in 1969. The building has been occupied by Continental Industries of Utah carpet, Indico Distributing, floor coverings, Utah Paperbox Company, Uinta Urethane Recyclers, and most recently EPC International/Uinta Urethane Recyclers.

Figure 1: Site Map (Salt Lake County Assessor's website: https://slco.org/assessor/)

The Site is adjoined by the following:

Direction	Adjoining Properties
North	Crown Plating Company (Salt Lake Parcel No. 15-02-204-006) a facility specializing in decorative plating of chrome, copper, nickel, gold, and brass. The facility is listed as a RCRA Generator of Hazardous Waste.
East	Jeremy Street and Heritage Forge (Salt Lake County Parcel No. 15-02-226-002).
South	Vacant commercial property (Salt Lake County Parcel No. 15-02-226-008).
West	EPC International Warehouse adjoins the Site to the west with Salt Lake County Parcel No. 15-02-204-004.

This ABCA has been prepared to support redevelopment of the site by prospective developers by providing preliminary cleanup planning information. It is Terracon's understanding a prospective developer intends to redevelop the Site for commercial use, with the possibility of residential use in the future.

1.1 Phase I Environmental Site Assessment – August 31, 2015

In August 2015, Terracon performed a Phase I Environmental Site Assessment (ESA; Reference 2015a in Section 4.0) on the Site for the Redevelopment Agency of Salt Lake City under their Hazardous Substance Grant (EPA Cooperative Agreement No. 96809201). The Phase I ESA identified the following Recognized Environmental Condition (RECs) associated with the Site.

- **Impacts from adjoining properties:** The north adjacent property has documented improper disposal of TCA very near or on the property line. This identified release represents a REC to the subject property.
- **Long-term industrial use:** The site has been an electroplating shop for approximately 38 years. Evidences of releases from these industrial operations were widespread and included leaking and spilling.

The Phase I ESA recommended a subsurface investigation be conducted at the Site to determine if the identified RECs had impacted the soils or groundwater.

1.2 Phase II Environmental Site Assessment – February 8, 2016

Terracon performed a Phase II ESA (Reference 2016a in Section 4.0) on the Site for the Redevelopment Agency of Salt Lake City under their Hazardous Substance Grant (EPA Cooperative Agreement No. 96809601). The Phase II ESA was performed to investigate the REC identified in the Phase I ESA (see Section 1.1) and to perform a Building Materials Survey to identify asbestos-containing materials (ACM) and other regulated hazardous materials that would require removal prior to building renovation or demolition. These activities were conducted in accordance with the Site-specific *Sampling and Analysis Plan (*Reference 2018a in Section 4.0) and *Quality Assurance Project Plan* (Reference 2014a in Section 4.0) that were prepared for and approved by the EPA for this Site.

The Phase II ESA scope of work included advancement of investigation borings for collection of soil and groundwater samples near the following features of concern.

- the Plate Shop;
- the north loading dock;
- the northern portion of the property and along the property boundary where improper disposal of wastes at the adjacent property (to the north) has been documented; and,
- the eastern property boundary to evaluate whether potential up-gradient, off-site impacts have migrated to the site.

The sampling strategy was also designed to evaluate the overall extent of contamination, if present, on the site and in the presumed down-gradient direction from the features of concern.

This involved sampling near the western property boundary, west and southwest of the features of concern. The sampling design also included the completion of three of the borings as temporary piezometers to allow evaluation of the local groundwater flow conditions.

Laboratory analyses of soil and groundwater, samples were focused primarily on volatile organic compounds (VOCs) and metals.

The Phase II ESA report concluded the following.

Soil Results

- The primary soil contaminant identified in this investigation was hexavalent chromium. Hexavalent chromium concentrations in soil were reported across the Site in shallow soils at concentrations exceeding one or more screening levels. The highest concentrations (above the industrial EPA RSL) were reported at soil borings SE-SB-03, SE-SB-04, and SD-SB-13 which are located along the western property boundary (undeveloped open ground) and at the northeast corner (under pavement).
- As reported in the 2015 investigation and again identified during this investigation, arsenic concentrations in soil samples collected throughout the site are higher than the industrial RSL of 3 mg/kg. However, such exceedances are common throughout the Salt Lake Valley area where background values reportedly range from non-detect to 97 mg/kg (U.S. Geological Survey Professional Paper 1270; 1984). The arsenic concentrations reported in Site soil samples ranged from 4.62 to 17.5 mg/kg in the 2015 investigation, and from 1.6 to 52.9 mg/kg in the 2018 investigation. Based on these results, the reported arsenic concentrations in soil appear to be representative of natural background levels.

Groundwater Results

- Groundwater was typically encountered at depths of approximately 9 feet below the ground surface.
- Groundwater flow direction was to the west-southwest, with a relatively low gradient of approximately 0.0025 feet per foot.
- The primary contaminants identified in groundwater are trichloroethene (TCE) and hexavalent chromium. Dissolved TCE concentrations were reported above the EPA Tapwater RSL, EPA MCL and the Target Groundwater Vapor Intrusion Screening Level (VISL) in the western area of the Site (SE-SB-03, SE-SB-04, SE-SB-05, SE-SB-06, and SE-SB-07) and above the EPA Tapwater RSL along the northern property boundary (SE-SB-10, and SE-SB-11). The highest concentration (0.0255 mg/l) was reported at location SE-SB-6 which is adjacent to the building near the northwest corner of the Plate Shop inside the building. These results suggest that chemical seepage from the Plate Shop may be a

source of TCE contamination at the Site, and that off-site activities (from the northern adjacent property) may also be impacting groundwater at the Site.

- Hexavalent chromium was detected in groundwater samples from the western portion of the Site (SW-SB-02, SE-SB-04, SE-SB-05, SE-SB-06, SE-SB-07) and at the northern property boundary (SE-SB-12). In the samples from these borings, the detected (estimated J-flagged) concentrations of hexavalent chromium ranged from 0.0002 to 0.0004 mg/l, which is below the EPA MCL of 0.10 mg/l (for total chromium including the hexavalent form) but above the Tapwater RSL of 0.000035 mg/l. The highest detected concentration (0.0004 mg/l) was at boring SE-SB-05 located near the southwest corner of the Plate Shop. These results also suggest that seepage from the Plate Shop may have impacted groundwater at the Site, but that off-site impacts to groundwater may also be migrating onto the Site.
- Concentrations of dissolved arsenic in groundwater are below the arsenic MCL/UGWQPS of 0.01 mg/l, although dissolved arsenic concentrations are locally higher than the tapwater RSL of 0.000052 mg/l.
- Slightly acidic conditions in groundwater were observed at several locations across the Site, with field-measured pH values ranging from 6.13 (near the southeast corner of the Site) to 6.68 (in the north-central portion of the Site).

1.3 Phase I Environmental Site Assessment – February 14, 2018

In February 2018, Terracon performed a Phase I ESA (Reference 2018c in Section 4.0) on the Site for Salt Lake County under its Hazardous Substance Grant (EPA Cooperative Agreement No. 96835701). The Phase I ESA identified the following Recognized Environmental Conditions (RECs) associated with the Site.

- **Impacts from north-adjoining property:** The north-adjoining property has documented improper disposal of TCA very near or on the property line. This identified release represents a REC to the Site.
- **Long-term industrial use:** The site has been an electroplating shop for approximately 40 years. Evidences of releases from these industrial operations were widespread and included leaking and spilling. Historical solvent uses, RCRA hazardous waste storage and disposal, the wastewater discharge system, and staining are considered part of the long-term industrial use REC at the Site.
- **Soil and Groundwater impacts at the Site**: Based on Terracon's Phase II ESA, dated February 8, 2016, sampling at the site identified soil impacts of hexavalent

chromium concentrations above industrial and/or residential Regional Screening Levels (RSLs) in shallow soils across the Site. Groundwater has been impacted by TCE above Maximum Contaminant Levels (MCLs) and/or Target Groundwater Vapor Intrusion Screening Levels (VISLs), and hexavalent chromium below MCL and above the tapwater RSL.

The Phase I ESA recommended an additional Phase II ESA be conducted at the Site to assess the vertical and horizontal extent of impacts to soils or groundwater to develop cleanup planning documents for the site.

1.4 Phase II Environmental Site Assessment – August 2018

Terracon performed a subsequent site investigation (Reference 2018d in Section 4.0) for the property with the purpose of gathering additional data to bridge the gaps identified in the Terracon 2016 Phase II ESA, the Terracon 2018 Phase I ESA, and to aid with providing the information needed to develop an Analysis of Brownfield Cleanup Alternatives (ABCA) for the Site. These activities were conducted in accordance with a Site-specific Sampling and Analysis Plan (SAP, Terracon 2018a) that was prepared and approved by EPA for this Site. The SAP established specific Site objectives, sampling process design, and details regarding Site-specific sampling and analyses, and was used in conjunction with the EPA-approved Quality Assurance Project Plan (QAPP, Terracon 2018b).

The investigation included advancing nine (9) soil borings (SE-SB-16 to 24) using direct-push drilling equipment to allow for the collection of subsurface soil and groundwater samples. Soil and groundwater samples were collected from these borings for analysis of metals, VOCs and hexavalent chromium.

The investigation also included the collection and analyses of sub-slab vapor samples from four distinct portions of the building: 1) northwest part of building (Drill/Router Room, SE-VP-1); 2) northeast part of building (Washout Booth, SE-VP-2); 3) adjacent to a sample collection point and sewer lateral (SE-VP-3); and 4) Plating Room (SE-VP-4).

The following is an overview of the identified contaminants in soil, groundwater, and sub-slab soil vapor during the August 2018 Phase II ESA.

Soil Results

The presence of hexavalent chromium in soils both outside and underneath the building was confirmed at depths ranging from 1 to 10 feet below grade surface (bgs). The concentrations reported in this investigation exceeded the Residential RSL but did not exceed the Industrial RSL.

TCE was identified in soils at 7 feet bgs (SE-SB-21) near a sump located in the Plating Room at concentrations that exceeded the Residential and Industrial RSLs. Bromodichloromethane and

lead were also identified in boring SE-SB-21 at a depth of 7 feet at levels exceeding the residential RSL.

Naphthalene was detected in soil samples from borings located in the Plating Room at a depth of 7 feet. The detections were below State of Utah and EPA screening levels.

As reported in the 2015 investigation and identified during this investigation, arsenic concentrations in soil samples collected throughout the site are higher than the industrial RSL of 3 mg/kg. However, such exceedances are common throughout the Salt Lake Valley area where background values reportedly range from non-detect to 97 mg/kg (U.S. Geological Survey Professional Paper 1270; 1984). The arsenic concentrations reported in site soil samples ranged from 4.62 to 17.5 mg/kg in the 2015 investigation, and from 1.6 to 52.9 mg/kg in the 2018 investigation. Based on these results, the reported arsenic concentrations in soil appear to be representative of natural background levels.

Groundwater Results

Based on the results of this additional investigation, the presence of TCE in groundwater was confirmed at concentrations that exceed the MCL and the Target Groundwater Commercial VISL.

The presence of dissolved hexavalent chromium in groundwater was confirmed at concentrations that exceeded the RSL for Tapwater but below the MCL.

Sub-Slab Vapor Results

The results of the sub-slab soil gas samples collected from the building interior reported naphthalene and TCE were present at concentrations that exceeded the Target Sub-Slab Soil Gas Commercial VISL. It appears there is a potential for vapor intrusion at this site.

1.5 Summary of Investigations Conducted to Date

Identified soil impacts include hexavalent chromium, TCE. and Bromodichloromethane concentrations above industrial and/or residential RSLs. The highest concentrations of hexavalent chromium (exceeding the industrial EPA RSL) were reported from samples collected along the western property boundary and at the northeast corner of the Site (beneath pavement). The highest concentration of TCE in soil (exceeding the industrial EPA RSL) was encountered adjacent to a sump connected to a sewer lateral in the Plate Shop. Bromodichloromethane was found next to the sump at a depth of 7 feet bgs at a concentration above the EPA residential RSL. Naphthalene was found in soils at 7 feet bgs in several locations but at concentrations below EPA RSLs.

Groundwater has been impacted by TCE in the western and northwest portion of the site and from the most recent investigation below the building footprint. The highest concentrations of dissolved TCE (above MCLs and/or Target Groundwater VISLs) have been identified below the southwest corner of the building (Plate Shop), adjacent to a sump and sewer lateral.

Dissolved hexavalent chromium is also present in groundwater at concentrations below the MCL but above the Tapwater RSL. Concentrations of dissolved hexavalent chromium were reported from samples collected along the western property boundary and at the northeast corner of the site. The highest detected concentrations are from the southwest corner of the Plate Shop, suggesting that seepage from the Plate Shop may have impacted groundwater at the site, but that off-site impacts to groundwater may also be migrating onto the site from the property to the north.

Sub-slab soil gas samples showed detections of TCE above the Target Sub-Slab Soil Gas Commercial VISL at three locations in the building, and at one other location above the residential VISL. The highest concentrations of TCE were found next to a sample collection point adjacent to the sewer lateral labeled as VP-3. Naphthalene was also detected in two of the soil gas samples with one sample above the Target Sub-Slab Soil Gas Commercial VISL and one above the Residential VISL. The source of TCE may be from Schovaer's documented use of the chemical. The origin of the naphthalene is unknown. There is no documented use of chemicals that contained naphthalene. Based on Terracon's experience, trichloroethene (in soil, groundwater, and Sub-slab soil gas) and hexavalent chromium (in soil) represent the greatest risk to human health and would likely be the drivers for corrective action at the Site. Listed below are the Contaminants of Concern (COC).

Contaminants of Concern

Analyte	Matrix	Exposure Scenario	Screening tool
Hexavalent chromium	Soil	Residential/Industrial	EPA RSL
Bromodichloromethane	Soil	Residential	EPA RSL
Trichloroethene (TCE)	Soil, soil gas and groundwater	Residential/ Commercial & Industrial	EPA RSL, MCL, VISL
Naphthalene	Soil gas	Residential/Commercial	EPA VISL

1.6 Project Goal

The Redevelopment Agency (RDA) of Salt Lake City designated a 319-acre area between Interstate 15 to Redwood Road along North Temple Street as a blighted redevelopment area. According to the RDA's website, "The North Temple Project Area (NT) is a major entryway to Salt Lake City. Served by the TRAX airport light rail line, or "Green Line," the North Temple Corridor connects Downtown to the Salt Lake City International Airport, making the area an opportune site for new transit-oriented development. The RDA is working to attract catalytic and infill development to the area by promoting and utilizing its construction loan programs, environmental

assessment grants, and community outreach partnerships. The area's form-based zoning and significant street improvements are transforming it into a vibrant, walkable, transit-oriented corridor."

The Site is in the Folsom Corridor of the North Temple Project Area, and per the statement above, environmental assessment grants have been used to assess the Site and nearby properties within the Folsom Corridor. According to the RDA's *North Temple Project Area 2015-2019 Strategic Plan*, the RDA's priorities for the Folsom Corridor are to "Engage in pre-development activities for the rehabilitation of the Folsom Avenue corridor as a public space and development corridor."

Salt Lake City, and subsequently Salt Lake County, have both used Brownfields Assessment Grant funds to assess and investigate the Schovaers Electronics Site for environmental impacts. The objective of the assessments and investigations is to provide information to prospective developers to assist with redevelopment of the property.

Terracon understands a developer intends to acquire the property for redevelopment for commercial use, with the possibility of residential use in the future, which aligns with the RDA's objective to attract catalytic and infill development to the area. This redevelopment prospect within the Folsom Corridor, if successful, will serve as a catalyst for future redevelopment efforts. Remediation of documented impacts to soil, impacts to soil vapor, and groundwater may be required to support this redevelopment strategy.

2.0 APPLICABLE REGULATIONS AND CLEANUP STANDARDS

2.1 Cleanup Oversight Responsibility

Terracon believes the two most appropriate regulatory programs to oversee remediation of the Site are the Utah Department of Environmental Quality (DEQ) - Voluntary Cleanup Program (VCP) or the Utah DEQ, Division of Waste Management and Radiation Control (DWMRC), Corrective Action Program. Either program may be appropriate if cleanup is funded privately, but the VCP will likely be required if Brownfield funds are used.

The goal of both regulatory programs is to promote the investigation and cleanup of contaminated sites under a cooperative, regulatory-friendly framework. The purpose of the programs is to encourage the investigation and cleanup of sites where there has been a suspected or confirmed contaminant release threatening public health and the environment. A successful VCP cleanup results in the issuance of a Certificate of Completion, which provides a limited release of liability to qualified applicants as specified in the statute. The liability release is transferable to subsequent property owners. A successful DWMRC Corrective Action Program cleanup results in two possible designations depending on the level of residual risk as determined in accordance with DWMRC requirements: (a) Corrective Action Complete without Controls (CACWOCs), or (b)

Corrective Action Complete with Controls (CACWCs), with controls provided by an Environmental Covenant recorded on the title of the property and a Site Management Plan (SMP).

All work plans, including sampling and analysis plans and quality assurance project plans, and reports related to environmental investigations and remediation activities conducted at the Site will be submitted to the selected agency for review and approval.

2.2 Cleanup Standards

Terracon understand that a developer intends to redevelop the property for commercial use with the possibility of residential development in the future. With this anticipated exposure scenario, Terracon anticipates the following screening levels will be used as the Cleanup Standards for the Site.

- **Soil:** EPA's most recent RSLs for residential soil (current version is May 2018) with a target cancer risk of 1x10-6 and a hazard quotient of 1.
- **Groundwater:** EPA's most recent Maximum Contaminant Levels (MCLs) for drinking water (current version is May 2018) or EPA's most recent Target Groundwater Concentration Vapor Intrusion Screening Levels for residential exposure scenarios (current version is May 2018) with a target cancer risk of 1x10-6 and a hazard quotient of 1.
- **Soil Vapor:** EPA's most recent Target Sub-slab and Near-source Soil Gas Concentration Vapor Intrusion Screening Levels for residential exposure scenarios (current version is May 2018) with a target cancer risk of 1x10-6 and a hazard quotient of 1.
- **Site-specific Risk-based Standards:** It is possible that site-specific risk-based cleanup standards for soil, groundwater, or soil vapor may be applied in accordance with state and federal regulations.

2.3 Laws & Regulations Applicable to the Cleanup

Laws and regulations that are applicable to this cleanup include:

- Occupational Safety and Health Act, Hazardous Waste Operations and Emergency Response Standard (40CFR1910.120) and applicable Safety and Health Regulations for Construction (29CFR1926).
- National Emissions Standards for Hazardous Air Pollutants (NESHAP) (40CFR61 – Subpart M: National Emission Standard for Asbestos).
- Department of Transportation, Hazardous Materials Regulations (49CFR Subtitle B, Chapter 1, Subchapter C).

- Resource Conservation and Recovery Act (42 U.S.C. § 6901, et. seq.).
- National Historic Preservation Act of 1966, Section 106.
- Utah Code Ann. 19-6-401 et. seq. (Underground Storage Tank Act and rules promulgated there under (Utah Admin Code, R311)) and the Corrective Action Cleanup Standards Policy Per UST and CERCLA Acts, Utah Admin. Code, R311-211.
- Utah Code Ann. 19-6-101 et. seq. (Solid and Hazardous Waste Act and rules promulgated there under (Utah Admin Code, R315)).
- Utah Code Ann. 19-5-101 et. seq. (Water Quality Act and rules promulgated there under (Utah Admin Code, R317)).
- Utah Code Ann. 19-2-101 et. seq. (Air Conservation Act and rules promulgated there under (Utah Admin Code, R307)).
- Utah Code Ann. 57-25-101 et. seq. (Uniform Environmental Covenants Act).
- Salt Lake City, Salt Lake County, and State building codes and construction requirements.
- Utah Code Ann. Title 19, Chapter 6, Part 3 et seq. (Hazardous Substances Mitigation Act).
- Utah Code Ann. Title 19, Chapter 8 et seq. (Voluntary Cleanup Program), if the Site cleanup is conducted under the VCP.
- Federal Small Business Liability Relief and Brownfields Revitalization Act, if Brownfields or other Federal funding is used.
- Federal Davis-Bacon Act, if Brownfields or other Federal funding is used.

In addition, all appropriate permits and notifications (e.g., Blue Stakes of Utah Utility Notification Center, soil disposal acceptance notification, soil transport/disposal manifests, etc.) will be obtained prior to the cleanup activities commencing.

2.4 Climate Change Considerations

Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance, establishes an integrated strategy for sustainability within the Federal Government. Under the Executive Order, each agency is required to evaluate their climate change risks and vulnerabilities to manage the effects of climate change on the agency's mission and operations in both the short and long-term as part of the formal Strategic Sustainability Performance Planning process.

Effective with Fiscal Year 2013, EPA's Brownfields Program initiated a change to cooperative agreements for Cleanup and Revolving Loan Fund awards. It requires cooperative agreement recipients to evaluate the resilience of remedial options funded by the award in light of reasonably

foreseeable changing climate conditions. As directed under EPA's Climate Change Adaptation Plan, the ABCA must include a discussion of observed and forecasted climate change conditions for the area of the project and the associated site-specific risk factors. Specifically, this is to be presented as part of the ABCA. As the possibility exists that Cleanup grant funds or Revolving Loan Fund grand funds may be utilized for cleanup actions at the Site, climate change has been considered in this ABCA.

2.4.1 General Considerations

In considering remedy resiliency Terracon consulted the following resources as authoritative sources:

- Climate Resources on Data.gov
- U.S. Global Change Research Program (USGCRP)
- EPA Climate Change on EPA.gov

2.4.2 Site-Specific Considerations

The Site and Utah are in EPA's climate designation of Southwest (Reference 2016b in Section 4.0). The Southwest is the hottest and driest region in the nation (Reference 2014b in Section 4.0). Extending from the Pacific Ocean east to the Rocky Mountains and south to the Mexican border, this region is home to about 56 million people, about 90% of whom live in cities, including Albuquerque, Phoenix, Las Vegas, Salt Lake City, Denver, San Diego, Los Angeles, Sacramento, and San Francisco. The population of the Southwest is expected to increase by nearly 70% by mid-century (Reference 2014b in Section 4.0). The Southwest encompasses a wide range in elevations, spanning valleys that are below sea level to mountain ranges that contain some of the highest peaks in the contiguous United States. The region's southern portion includes deserts, like the Mojave. In contrast, northern California, the Rocky Mountains, and the Sierra Nevada mountain range tend to get more precipitation and snow. The Central Valley in California is one of the most productive agricultural regions in the country.

Climate change is affecting the Southwest. Temperatures have increased by almost 2°F in the last century, with the 2001-2010 decade being the warmest since records began 110 years ago (Reference 2014b in Section 4.0). The length of the frost-free season has increased by 19 days in recent decades (Reference 2014c in Section 4.0). Average annual temperatures are projected to rise an additional 3.5°F to 9.5°F by the end of this century, with the greatest temperature increases expected in the summer and fall (Reference 2014b in Section 4.0). Drought conditions are already common in the Southwest and drought periods are expected to become more frequent, intense, and longer. Drought will affect important water sources, including the Colorado River Basin (Reference 2014b in Section 4.0). Combined with expected population growth, climate change will exacerbate existing stresses.

Higher temperatures lead to greater evaporation and surface water losses, more heat stress, and increased energy demand for cooling. Over the last 50 years, there has been less precipitation falling as snow late in the winter and snow melt has occurred earlier (Reference 2014b in Section 4.0). Maximum streamflow has also occurred earlier in the year and total yearly streamflow has decreased in the last decade. Increasing temperatures will also increase evaporation, causing river-flow reductions and dwindling reservoirs.

These considerations do not identify property-specific risks in considering resiliency of remedy at this property as part of feasibility and implementability.

3.0 ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES

A discussion of the cleanup objectives and an evaluation of remedial alternatives for the Site are provided below.

3.1 Cleanup Objectives

- Hexavalent chromium (exceeding the industrial EPA RSL) was reported from samples collected along the western property boundary and at the northeast corner of the site (beneath pavement). A remedial goal would be to reduce exposure potential to the hexavalent chromium in shallow soils.

- Trichloroethene has been detected in soil, groundwater and soil gas. The highest concentrations were found in the Plating Shop and adjacent sewer lateral in the building. Additionally, TCE was encountered in groundwater in the southwest portion of the property. An objective is to mitigate vapors in the subsurface to reduce the vapor intrusion potential.

- Naphthalene was encountered in soil gas at levels above the EPA Target Sub-Slab Soil Gas Commercial VISL. An objective is to mitigate vapors in the subsurface to reduce the vapor intrusion potential.

- Bromodichloromethane was detected in soil at a depth of 7 feet bgs adjacent to the sump in the Plating Shop. The level of detection was above the EPA residential RSL. An objective is to reduce exposure potential to this compound in soils.

3.2 Cleanup Alternatives Considered

Terracon has discussed proposed redevelopment scenarios with the future developer and has incorporated information from those conversations into this ABCA. The assumptions behind the cleanup alternatives discussions include the following.

- The Site will be redeveloped for commercial/industrial use and may incorporate residential development in the future;
- TCE has been detected in soil and groundwater. It is unknown whether the TCE plume in groundwater extends beyond the property boundaries. Depending on which of the DEQ regulatory programs (VCP or DWMRC) will be providing assistance and oversight, additional investigative efforts may be required to determine if off-site impacts have occurred;
- Hexavalent chromium in shallow soils was detected in the northeast and western parts of the property;
- it is undetermined whether the existing on-site building will be razed as part of the Site's redevelopment;
- if the current building remains, a vapor mitigation system could be installed to address sub-slab vapor concerns (e.g., sub-slab depressurization system);
- if the current building is razed, a vapor mitigation system could be included in the future building's design;
- The Target Sub-Slab Soil Gas Commercial VISL for TCE was exceeded at three sub-slab sampling locations in the existing building; the fourth location (northeast corner) was above the residential VISL;
- The Target Sub-Slab Soil Gas Commercial VISL for naphthalene was exceeded in one location near the sewer lateral, and naphthalene exceeded the Target Sub-Slab Soil Gas Residential VISL in the northeast corner of the building; and
- An Environmental Covenant will likely need to be recorded on the title of the property by its Owner(s) to place institutional controls and/or engineering control requirements on the property. The Environmental Covenant will likely restrict groundwater uses (i.e., no potable use of groundwater) and may incorporate additional measures to address possible exposure to the contaminants of concern.

In addition, ACMs were identified along with mercury containing fluorescent lights and thermostats, PCB containing ballasts and transformers, and refrigeration units containing chlorofluorocarbons. Costs associated with removal of the ACMs or items containing hazardous materials are not included in the cleanup alternatives considered.

Table 1 presents cleanup alternatives with respect to: effectiveness, long-term reliability, implementability, and cost. Also presented are advantages and disadvantages of the proposed technology. The final solution may involve multiple technologies to achieve remedial goals. More detailed comparison of potential costs to implement is provided in **Table 2**. The tables can be found attached to this report in Appendix A.

3.2.1 Alternative 1: No Action

The No Action alternative is included as a baseline comparison to other remedial alternatives and assumes no action is taken.

3.2.2 Alternative 2: Surficial Soil Removal, Outside Building Perimeter

This alternative is a stand-alone solution for remedial action for surficial soils impacted by hexavalent chromium but does not address the other COCs. The necessity of this alternative depends on the future development of the site. Exposure to soils impacted by hexavalent chromium could be managed in-place through engineering controls to remove potential exposure pathways. This alternative would generally include the following components:

- Excavate 12 to 24 inches of surface soils impacted with hexavalent chromium and replace with non-impacted “clean” imported fill to reduce future exposure from hexavalent chromium. As an alternative, hardscaping or equivalent could be used to eliminate exposure routes. For contamination left onsite, activity and use limitations would need to be applied to ensure exposure routes remain incomplete.
- Area of excavation is along the west property boundary and in the northeast corner of the property.
- Dispose of the soil an appropriately-permitted facility.

Soil may require waste characterization to identify an appropriate disposal facility and to generate a waste profile for the facility. If any of the impacted soil is characterized as a RCRA regulated hazardous waste, the wastes will be segregated, and the hazardous waste portions will be sent to an approved hazardous waste landfill. For the purpose of this ABCA, it is assumed the material can be disposed of as a non-hazardous waste. In addition, a cleanup completion report will be prepared to document the cleanup activities, the final condition of the Site, and that the Project Goal and Cleanup Standards were met.

3.2.3 Alternative 3: Vapor Mitigation System (VMS)

The alternative would provide vapor mitigation from accumulating sub-slab soil gas associated with impacted soil and groundwater. The alternative does not address the hexavalent chromium in soils. Trichloroethene and naphthalene were both identified at concentrations that exceed the EPA commercial target sub slab soil gas VISL. Additionally, TCE was also found in groundwater

at concentrations that exceed the EPA commercial Target Groundwater VISL. Both contaminants pose a vapor intrusion hazard. The purpose of the VMS is to protect building occupants from potentially harmful accumulating vapors. The approach would depend on whether the building is to be left or razed and reconstructed and could act as a standalone solution, if the goal is to solely mitigate sub-slab soil gas.

Building to remain

If the building is to remain, the most practical approach will be to install a sub-slab depressurization system under the existing floor slabs. The system uses a small vacuum blower to induce a negative pressure below the floor slab. For this type of system to be effective, there needs to be a coarse or permeable layer supporting the floor slab to allow for air flow. Collected soil gas is then exhausted to the atmosphere. To design the system, pilot testing will be required to determine vacuum and air flow requirements to achieve a minimum 0.01 inches of H_2O negative pressure below the floor slab. In the event pilot testing determines that a negative pressure will not be achieved with the existing slab design, the slab may need to be removed and replaced, modified or a multiple zone system may need to be employed.

Building razed

If the building is to be razed and replaced by a new building, consideration should be given to design a passive type system that could include a passive vent system and vapor intrusion barrier. This type of system would offer more confidence due to the engineered approach, integrating the VMS with building materials and components, installation by a certified installer, construction oversight by a certified inspector providing an entire building solution.

3.2.4 Alternative 4: Sump, Impacted Soil and Sewer Lateral Removal

Alternative 4 targets impacted soil in the Plating Shop and sewer lateral. Soils in the Plating Shop exhibited impacts from TCE and bromodichloromethane. The TCE is also a contributor to the vapor intrusion hazard. The impacted soil also contains naphthalene but at concentrations below the EPA residential and industrial RSLs. This alternative specifically addresses VOCs found in soil that may have been introduced into the subsurface through the sewer. This alternative does not address the hexavalent chromium in shallow soils. The treatment may be implemented regardless of whether the current building is razed. The building would affect excavation logistics and with the building in-place, would be costlier. If the building were razed, implementation would be prior to construction of a new building. This alternative would generally include the following components:

- removal of the floor drain, sump structure and sewer lateral;
- excavation of 10 to 20 cubic yards of impacted soils from the vadose zone and beneath or around the sump and sewer lateral;

- disposal of the sump, soil and sewer lateral at an appropriately-permitted facility;
- waste characterization of the sump contents, floor drain residuals, and impacted soils beneath the sump to determine appropriate disposal facilities; and
- replacement of sump structure, floor drains and sewer lateral as needed for future Site use, and prior to backfilling, collection of confirmation samples to document soil impacts have been removed.

If any of the impacted soil is characterized as a RCRA regulated hazardous waste, the wastes will be segregated and the hazardous waste portions will be sent to an approved hazardous waste landfill. For the purpose of this ABCA, it is assumed the material can be disposed of as a non-hazardous waste. This alternative does not directly address impacted groundwater, although it will remove an ongoing source of TCE impact to groundwater. The method may reduce or eliminate the vapor intrusion potential by soil removal.

3.2.5 Alternative 5: Soil Vapor Extraction (SVE)

Alternative 5 is Soil Vapor Extraction (SVE), a remediation technology with an objective to substantially reduce the concentration of volatile contaminants in the source media (e.g., subsurface soil) to levels that will permanently reduce sub slab vapor concentrations to levels below the EPA's Target Sub-Slab Soil Gas Concentration VISL, specifically for TCE and naphthalene. SVE is not an appropriate technology for direct remediation of groundwater (although by remediating soils it will indirectly reduce ongoing impacts to groundwater), nor is the technology appropriate for remediation of the hexavalent chromium in soils. The technology uses a blower coupled to vapor extraction wells installed in the source area. The blower induces a vacuum for removing soil gas and accelerating volatilization of contaminants from soil. The difference between SVE and VMS is that SVE removes source and VMS removes or prevents soil gas accumulating below the floor slab. Both SVE and VMS methods may require a Notice of Intent and reporting to the Utah Department of Air Quality. Extracted vapors may require treatment prior to discharge to the atmosphere to reduce Hazardous Air Pollutants (HAPs).

The SVE system may be installed regardless of whether the current building is razed. If the current building remains, the SVE system may include vapor extraction wells located in the building and in locations outside the building's footprint. If the building is razed, the SVE system's vapor extraction wells will be in remaining contaminant source areas, if any, and areas where soil vapors exceeding residential or commercial VISLs, as applicable, have been identified, but the exact locations may need to be tailored to fit within future development plans.

Pilot testing would be required to determine the feasibility of using SVE and to determine site parameters for design. SVE systems can take months to years to achieve cleanup and require ongoing operations and maintenance (O&M) and sampling to determine system effectiveness.

3.2.6 Alternative 6: In-Situ Chemical Oxidation

Alternative 6 targets the organic contaminants in groundwater and, to a lesser degree, impacted soils. This alternative proposes to use a chemical oxidant to transform/degrade the TCE to levels that would be more protective of the EPA Target Groundwater Concentration VISL and to mitigate potential off-site impacts. The technology may also be appropriate for destruction of other volatile organics that may be present in groundwater and to a lesser degree in soils. The technology would not be appropriate for use to remediate the hexavalent chromium in soils.

This alternative is intended as an additional amendment implemented at the time of soil removal as outlined in Alternative 4. Activated persulfate would be mixed above grade and added as a solution to the open excavation. Additional persulfate would be injected through direct push methods down gradient of the sump to reduce TCE concentrations near the property boundary. Several companies manufacture products that could be used. Further research and vendor coordination would be required to determine competing oxidant demands, suitable product, volumes and dosages to be applied, method of delivery, and concentration needed to achieve remedial goals.

The treatment may be applied regardless of whether the current building is razed or not, as the target area is not affected by the presence of the building. The building would affect the method of delivery and with the building in-place would be more-costly. If the building were razed, implementation would be prior to construction of a new building.

Chemical oxidation can be an effective system to remediate chlorinated hydrocarbons in the subsurface. Many factors play a role in the success of the proposed treatment. Some of these factors are listed below:

- Demand for the oxidant from target compounds and nontarget compounds
- Remedial goals
- Site geology
- Mass of oxidant
- Contact times
- Groundwater velocity

Additional subsurface information may be required to properly design treatment specifications and provide an appropriate delivery system to distribute the chemical in the target zones. The biggest challenge for chemical oxidation at the Site is the native, fine-grained soils observed in investigation borings, which typically included silts and clays in the impacted zones.

The applicable remedial alternatives for the analytes exceeding screening levels are summarized below.

Analyte	Remedial Alternative	Screening tool	Exposure Scenario	Matrix
Hexavalent chromium	2	EPA RSL	Residential Industrial	Soil
Bromodichloromethane	4, 5	EPA RSL	Residential	Soil
Trichloroethene	3, 4, 5, 6	EPA RSL, MCL, VISL	Residential Industrial Commercial	Soil, water, soil gas
Naphthalene	3, 4, 5, 6	EPA VISL	Residential Commercial	Soil gas

3.3 Recommended Cleanup Alternative

To achieve the Cleanup Objectives listed in Section 3.1, a multiple-component approach is recommended as discussed below.

The "No Action" option (Alternative 1) is not considered a viable option since it does meet the redevelopment objectives or protect from future exposure to site contaminants. The SVE option (Alternative 5) is a suitable alternative for the remediation of TCE-impacted soil and mitigation of vapor intrusion. However, the option does not address hexavalent chromium in soil, does not directly address groundwater contamination, and is considered the most expensive option requiring engineering, capital costs, installation, and long-term O&M and monitoring.

A multiple-component approach involving Alternatives 2 and 3 are recommended as a minimum. Alternatives 4 and 6 could be implemented to specifically address soil and groundwater impacts:

- Alternative 2 (hexavalent chromium impacted soil removal) eliminates exposure to near surface soils contaminated with hexavalent chromium. Depending on future development and resulting exposure scenarios, this alternative could be modified (for example, by re-location of the impacted soils below clean cover and/or hardscape) and removal may not be required. Contamination left onsite will pose use limitations and require site management for future uses to ensure exposure routes remain incomplete.
- Alternative 3 (VMS) addresses vapor intrusion, which is the main exposure pathway within the building interior.
- Alternative 4 (VOC impacted soil removal) reduces vapor intrusion and ongoing impacts to groundwater by source removal of impacted soils in the Plating Shop, sump and sewer lateral.
- Alternative 6 (chemical oxidation) targets groundwater in the Plating Shop and southwest property corner where TCE was found in groundwater at levels above

MCLs and within the building, above the Target Sub-Slab Soil Gas commercial VISL. This alternative is intended to complement Alternative 4.

Following implementation of a remedial strategy, a cleanup completion report would be generated to document that the cleanup activities were completed, along with the final condition of the Site based on cleanup confirmation sampling. Depending on which DEQ regulatory program provides oversight, a post-remediation risk assessment may also be required to calculate the level of residual human health risk, along with a Site Management Plan (SMP) specifying controls to manage the residual risks and the possibility of an Environmental Covenant to manage future Site use with remaining environmental impacts.

4.0 REFERENCES

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2015b Redevelopment Agency of Salt Lake City, 2015. *North Temple Project Area 2015-2019 Strategic Plan (Project Area Expires 2037)*. http://www.slcrda.com/wp-content/uploads/2016/08/NTStrategicPlan041415Final.pdf

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2016b Climate Change Indicators, A Closer Look: Temperature and Drought in the Southwest (Web update: August 2016). https://www.epa.gov/climate-indicators/southwest

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U.S. Geological Survey Professional Paper 1270; Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States 199

APPENDIX A
Tables

Table 1 – Brownfield Cleanup Alternatives Balancing Factor Evaluation

Remedial Alternative	Effectiveness	Long-term reliability	Implementability	Cost Implications
1. No Action	Does not address potential risks.	Does not address potential risks.	Not applicable for No Action.	No cost to implement. Potential cost implications on property value and future liabilities associated with contaminant exposure.
2. Surficial soil removal, outside building perimeter	Limited shallow soil removal in areas where hexavalent chromium was detected at above EPA RSLs to reduce exposure to soil. Does not address other COCs.	Addresses exposure to near surface soils contaminated with hexavalent chromium. Environmental covenants required to limit future uses and activities.	Minor implementation risks associated with excavation and transportation to appropriate disposal facility. Minor risk to community due to transportation. Requires the Owner to impose land use and activity restrictions to eliminate exposures to the hexavalent chromium impacted soils, if any remain at site.	Low to moderate costs for excavation, transportation, and disposal fees. Additional costs for backfill and compaction of excavation.
3. Vapor Mitigation System (VMS)	Addresses vapor intrusion from VOCs in groundwater and soils. VMS is not recognized as a remediation technology.	Does not address impacts to soil or groundwater. Requires the operation of a passive or active system fitted with alarm indicators in the event of system failure.	Can be implemented into the existing building or incorporated in the design of any future development. Properly maintained, the system would operate for the expected life of the building.	VMS: Moderate costs associated with vapor mitigation (either sub-slab depressurization for the existing building or a vapor mitigation system for new buildings).
4. Sump, impacted soil and sewer lateral removal	Effectively manages VOC soil impacts around the Plating Shop sump and sewer lateral. Reduces vapor intrusion from TCE and naphthalene by source removal of impacted soils. Does not address hexavalent chromium impacted soils.	Limited excavation, does not address soils in other areas. May improve groundwater quality in southwest corner of Building.	Minor implementation risks associated with excavation and transportation to appropriate disposal facility. Minor risk to community due to transportation. Can be implemented in the existing building or incorporated as part of any future development.	Excavation: Low to moderate costs for excavation, transportation, and disposal fees. Additional costs for backfill and compaction of excavation.

COST ESTIMATES UPDATED SEPTEMBER 2022

Remedial Alternative	Effectiveness	Long-term reliability	Implementability	Cost Implications
5. Soil Vapor Extraction (SVE)	Reduces source zone of VOC contaminant levels in soil to eliminate the need for a VMS.Technology could be employed to replace soil excavation in the Plating Shop and sewer lateral. Does not address hexavalent chromium impacted soils.	Targets the unsaturated zone with minimal benefits to the saturated zone. Semi-volatile contaminants may not be adequately addressed or require a longer remedial period. Requires pilot testing to determine feasibility of technology, equipment design and placement.	Design of a SVE system is based on building design, subsurface lithology and expected performance. Costs will be higher than a VMS as the goal is to eliminate or reduce the contaminant. source and eliminate the need for a VMS. After achieving remedial goals, the system could be decommissioned and removed.	SVE: High implementation cost to include engineering costs, pilot testing, capital equipment, installation/construction, permitting, and O&M.
6. In-Situ Chemical Oxidation	Reduces source zone contaminant levels of VOCs in groundwater and lesser degree soils. Does not remediate the hexavalent chromium in soils.	Reduces the concentration of chlorinated compounds through chemical oxidation. Reduces vapor intrusion potential and reduces off-site migration of chlorinated compounds.	Chemical injection in source area for degradation of chlorinated compounds (TCE), primarily in the saturated zone. Would require different mechanisms for delivery to groundwater versus vadose zone soils. Difficult to implement after development construction.	Chemical Oxidation: Low to moderate costs to procure injection chemical, methods for application and labor. May require multiple treatments.

COST ESTIMATES UPDATED SEPTEMBER 2022

Table 2 – Estimated Comparative Costs for Cleanup Alternatives

Cleanup Alternative	Estimated Costs	Notes	
1. No Action	$0	Not a viable option.	
2. Surficial soil removal, outside building perimeter Hexavalent chromium removal exterior of building	$40,000 - $45,000	**Removal of hexavalent chromium impacted soils to a depth of 12 inches below finish grades. Impacted area is the exterior northeast quadrant of the property. Assumes a 2,800 ft^2 area.**	
		$10,000	Remove, transport, and dispose of impacted soils. Contractor rough estimate based on similar projects. Includes all labor and equipment necessary. Assumes non-hazardous waste disposal at a RCRA Subtitle D landfill.
		$10,000	Import backfill and compact.
		$20,000 - $25,000	Cleanup planning document preparation, public notification of proposed cleanup, Terracon oversight during remediation, completion report.
3. Vapor Mitigation System (VMS) VOC removal from soil gas and indoor air	$95,000 - $160,000	**Building to Remain**	
		$15,000	Pilot testing for active sub-slab depressurization system.
		$15,000	Engineered design of system.
		$60,000 to $90,000	Installation of system. Costs vary due to unknowns for sizing of system, sub-slab component design and factors governing installation.
		$20,000	Operations and Maintenance for the life of the building.
		Building Razed and Replaced:	
		$15,000	Engineering Design.
		$40,000 - $70,000	Installation of system. Costs vary due to unknowns for sizing of system, sub-slab component design and factors governing installation.
		$20,000	Operations and Maintenance for the life of the building.
		Oversight and Reporting:	
		$20,000	Cleanup planning document preparation, public notification of proposed cleanup, Terracon oversight during installation, completion report.
4. Sump, impacted soil and sewer lateral removal Source zone removal from Plating Shop and sewer lateral	$25,000 - $30,000	**Removal of sump, disposal of sump contents, sewer lateral, and contaminated soils:**	
		$5,000 to $10,000	Remove, transport, and disposal of sump contents, sewer lateral and contaminated soils (10 to 20 cubic yards). Contractor rough estimate based on similar projects. Includes all labor and equipment necessary. Assumes non-hazardous waste disposal at a RCRA Subtitle D landfill.
		$5,000	Import backfill, compact and restoration.
		$15,000	Cleanup planning document preparation, public notification of proposed cleanup, Terracon oversight during installation, completion report.

COST ESTIMATES UPDATED SEPTEMBER 2022

Cleanup Alternative	Estimated Costs	Notes
5. Soil Vapor Extraction (SVE) Source zone removal of volatile compounds	$330,000 - $385,000	**Soil Vapor Extraction** $25,000 - $30,000 — Pilot testing. $20,000 — System design. $185,000 — Capital costs and installation. $25,000 — Terracon installation oversight. $50,000 to $75,000 — Operations and maintenance for 2 years. **Oversight and Reporting:** $25,000 - $50,000 — Cleanup planning document preparation; air emissions permitting and reporting; meetings with the selected regulatory agency; public notification of proposed cleanup; and cleanup completion report.
6. Groundwater Treatment, In-Situ Chemical Oxidation Chemical oxidation of organic compounds, targeting groundwater and lesser degree vadose zone soils	$81,500	**Oxidative Dechlorination Injection:** $12,500 — System design based on manufacturers recommendation. $50,000 — Cost for chemical, mixing, and delivery. $66,500 — Soil confirmation sampling and oversight. **Oversight and Reporting:** $12,500 — Cleanup planning document preparation; meetings with the selected regulatory agency; public notification of proposed cleanup; and cleanup completion report.

Estimated costs do not include regulatory oversight by either the VCP or the DWMRC. Agency oversight is billed at $110/hour.

APPENDIX B
Referenced Documents

List of Included Documents

2014a Terracon Consultants, Inc., 2014. *Quality Assurance Project Plan, Version 5, North Temple Brownfields Assessment, North Temple Street Corridor, Salt Lake City, Utah*. Terracon Project No. AL127481. Dated February 18, 2014.

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IHI ENVIRONMENTAL
A Terracon COMPANY

QUALITY ASSURANCE PROJECT PLAN
VERSION 5

North Temple Brownfields Assessment
North Temple Street Corridor
Salt Lake City, Utah

February 18, 2014

Prepared for:

The Redevelopment Agency of Salt Lake City
451 South State Street, Room 418
Salt Lake City, Utah 84114

Prepared by:

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N:\Projects\2012\AL127481\Working Files\SLC RDA Brownfields QAPP v5.docx

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IHI ENVIRONMENTAL
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GROUP A PROJECT MANAGEMENT

A1 Title and Approval Sheet

Project Title:

Quality Assurance Project Plan (Version 5)
North Temple Brownfields Assessment
North Temple Corridor, I-15 to Redwood Road
Salt Lake City, Utah

IHI Environmental (A Terracon Company) Project Manager

Signature _____ Date: 2/18/2014

Andy King
Printed Name

IHI Environmental (A Terracon Company) Project QA/QC Leader

_____ Date: 2/18/2014

Signature

W Wynn Ellis
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Salt Lake City Redevelopment Agency (Grantee) Approval:

_____ Date: 2-19-2014

Signature

Jill Wilkerson-Smith
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U.S. EPA Project Manager/QA Officer Approval:

_____ Date: 2/24/14

Signature

Christina Wilson
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Utah Department of Environmental Quality Project Manager Approval:

_____ Date: 11 MAR 2014

Signature

David Bird
Printed Name

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A Terracon COMPANY

A2 Table of Contents

FIGURE

TABLES

A2.1 Acronym List

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, as Amended
DERR	Division of Environmental Response and Remediation
DL	laboratory reporting limit a.k.a. practicable quantification limit
DQI	Data Quality Indicators
DQO	Data Quality Objectives
ESC	ESC Laboratories
HASP	Health and Safety Plan
IHI	IHI Environmental
LCS	Laboratory Control Sample
LFB	Laboratory Fortified Blank
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram (or parts per million)
mg/L	milligrams per liter (or parts per million)
µg/kg	micrograms per kilogram (or parts per billion)
µg/L	micrograms per liter (or parts per billion)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NELAP	National Environmental Laboratory Accreditation Program
OSHA	Occupational Safety and Health Act
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
ppb	parts per billion (in µg/kg or µg/L)
ppm	parts per million (in mg/kg or mg/L)
PQL	Practical Quantitation Limit
PR	Percent Recovery
PS	Performance Standard
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RDA	Redevelopment Agency of Salt Lake City
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
TOC	Table of Contents
UDEQ	Utah Department of Environmental Quality
US EPA	United States Environmental Protection Agency

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A4 Project/Task Organization

This Quality Assurance Project Plan (QAPP) provides guidelines for the acquisition, analysis, and validation of data collected as part of the North Temple Brownfields Assessment. Following is a brief description and identification of key personnel involved in the North Temple Brownfields Assessment Grant project. An organizational chart indicating the roles of these individuals is included as Figure 1.

The RDA Project Manager is the central point of contact for problem resolution and is the primary point of contact with the Consultant Project Manager regarding technical issues associated with this project. The RDA Project Manager is responsible for updating, maintaining, and distributing the QAPP and also acts as the Project QA Leader, conducting

QA activities and providing oversight during the field activities with routine visits to the jobsite. The RDA Project Manager for this project is:

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Phone: (801) 535-7243
Email: jill.wilkerson-smith@slcgov.com

The Consultant Project Manager will have responsibility for overseeing the activities associated with the Phase II ESAs. This person will be responsible for the preparation and maintenance of the QAPP, for distribution of the most current version of the QAPP to the individuals identified in A3, and for overall management of the field investigation portion of the project. The Consultant Project Manager will be the primary technical point of contact for communication with the RDA. Additional responsibilities include scheduling, subcontractor procurement, cost accounting and reporting, identification of potential problems and development of contingency plans to respond to the identified problems. The Consultant Project Manager for this project is:

Mr. Andy King, P.G.
Terracon Consultants, Inc.
640 Wilmington Avenue
Salt Lake City, UT 84106
Phone: (801) 746-5443
Email: arking@terracon.com

The Consultant QA/QC Officer for this project will act as an independent advisor to the Consultant Project Manager and will oversee project activities as necessary. This role will include reviewing any changes to the scope of the project and conducting final QA/QC reviews of all data included in final Phase II reports for properties that are assessed as part of this project. The Consultant QA/QC Officer for this project is:

Mr. Wynn John, PE, PG
IHI Environmental (A Terracon Company)
640 Wilmington Avenue
Salt Lake City, UT 84106
Phone: (801) 746-5480
Email: john@ihi-env.com

Regulatory oversight will be provided by the U.S. Environmental Protection Agency (EPA) Region 8 and the Utah Department of Environmental Quality (UDEQ). The EPA and UDEQ will collectively be referred to as the Agencies. The EPA Project Officer has overall approving authority for the project and also serves as the EPA Region 8 QA Officer and will review and approve the QAPP and SAPs and revisions in terms of quality-assurance aspects. The EPA Project Officer is:

Christina Wilson
1595 Wynkoop Street
Denver, Colorado 80202
Phone: (303) 312-6706
Email: Wilson.Christina@epa.gov

The RDA has involved the UDEQ because of their specific knowledge and experience. If impacts to the subsurface are identified during the sampling activities, the UDEQ will be the agency providing oversight for any subsequent cleanup activities that may be undertaken (which are beyond the scope of the current assessment grant). The UDEQ reviewed the draft QAPP and provided suggestions before the draft QAPP was submitted to EPA for comment. The UDEQ will remain a technical resource for the field activities and reporting throughout the course of the project. The UDEQ Project Manager for this project is:

Mr. David Bird
Utah Department of Environmental Quality
Division of Environmental Response and Remediation
P.O. Box 144840
Salt Lake City, UT 84114-4840
(801) 536-4100
Email: dgbird@utah.gov

A5 Problem Definition/Background

A5.1 Purpose /Background

The Salt Lake City Corporation received a Brownfields Assessment Grant to support long-term urban renewal along the North Temple Corridor. The purpose of the North Temple Brownfield Assessment is to identify environmentally compromised sites along the North Temple Corridor and develop a strategy for assessing potential impacts, evaluating redevelopment potential, cleanup objectives, and mitigation strategies.

Twenty-four Phase I Environmental Site Assessments (ESAs) were conducted throughout the corridor in 2010. Although Phase I ESAs are valid for a period of 180 days and the previous Phase I ESAs are currently expired, the previous Phase I ESAs identified multiple sites with known and potential environmental impacts.

The Brownfields Assessment includes developing a comprehensive web-based database detailing environmental information, identifying any data gaps hampering marketing or development, conducting Phase II assessments to resolve data gaps, developing corrective action plans, and preparing new Phase I ESAs on select properties in support of future redevelopment.

A6 Project Task/Description and Schedule

The results of the previous Phase I ESAs, along with additional environmental information compiled in the web-based database, will be used to screen properties for potential environmental impacts. Potential contaminants of concern include, but are not limited to, petroleum hydrocarbons, oil and grease, solvents, and heavy metals. Site-specific SAPs will be developed for the Phase II assessments to be conducted on each selected property that will detail the contaminants of concern, sampling locations, and sampling rationale. The Phase II reports will be consistent with standards at ASTM E1903-11.

A7 Quality Objectives and Criteria for Measurement Data

A7.1 Data Quality Objectives

Data Quality Objectives (DQOs) are quantitative and qualitative statements that specify the quality of data required to support the objectives of an investigation. DQOs are generated through the DQO Process, as shown in Guidance on Systematic Planning Using the Data Quality Objectives Process (QA/G-4) (EPA; February, 2006).

A7.2 Measurement Performance Criteria

Table 1 provides measurement performance criteria for the Data Quality Indicators (DQIs), as expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). The DQIs provide verifiable measurement criteria to determine if the data needs have been met. A brief definition of the PARCCS, including bias, are below.

Precision The measure of agreement among repeated measurements of the same property under identical, or substantially similar conditions; calculated as either the range or as the standard deviation. Precision may also be expressed as a percentage of the mean of the measurements, such as relative range or relative standard deviation (coefficient of variation).

Bias The systematic or persistent distortion of a measurement process that causes errors in one direction. Use reference materials or analyze spiked matrix samples.

Accuracy A measure of the overall agreement of a measurement to a known value; includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations.

Representativeness A qualitative term that expresses "the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition." (ANSI/ASQC 1995)

Comparability A qualitative term that expresses the measure of confidence that one data set can be compared to another and can be combined for the decision(s) to be made.

Completeness A measure of the amount of valid data needed to be obtained from a measurement system.

Sensitivity The capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest.

Soil and groundwater samples submitted for laboratory analyses will be considered definitive, consistent with EPA Superfund Data Categories (EPA; September 1993). Analytical results will be evaluated using current EPA Regional Screening Levels (RSLs) and Utah's Groundwater Quality Standards and the US EPA's Maximum Contaminant Levels. Petroleum hydrocarbon impacts suspected to originate from an underground storage tank will be evaluated using Utah's Department of Environmental Quality, Division of Environmental Response and Remediation's Leaking Underground Storage Tank Program Cleanup Levels. As such, the level of data sensitivity is required to result in laboratory reporting limits (practical quantitation limits or PQLs) that are below the regulatory screening levels listed above.

Certification and validation requirements apply to the laboratory. Regularly scheduled analyses of known duplicates, standards, and spiked samples are a routine aspect of data reduction, validation, and reporting procedures for the laboratory. The laboratory, which is associated with the National Environmental Laboratory Accreditation Program (NELAP), will verify the reliability and credibility of the analytical results. Additionally, the laboratory

reporting limits need to be lower than the screening levels for each of the analytes analyzed. A copy of the Laboratory Quality Assurance Manual with the laboratory reporting levels is provided in **Appendix A**.

A8 Special Training Requirements

The Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training, including an up-to-date 8-hour refresher course as required by OSHA, is required for field personnel. Initial 40-hour HAZWOPER "live" training is provided by reputable training providers in the local community, and annual refreshers are provided either by "live" training or via online courses approved by Terracon's Corporate Safety and Health Manager. Documentation (training certificates) of HAZWOPER and refresher training is maintained by Terracon's Corporate Safety and Health Manager in employees' confidential medical surveillance/environmental training files. In addition, Terracon's environmental project managers (or designees) are responsible for conducting site-specific safety briefings prior to beginning all Terracon hazardous waste site projects. IHI/Terracon will prepare a site-specific Health and Safety Plan (HASP) prior to mobilizing to the site to identify specific hazards that may be encountered during all phases of the field work.

A9 Documentation and Records

The data collected during the assessments will be summarized in Phase II reports documenting the investigation procedures and results, along with supporting maps, figures, and data summary tables. Appendices will include appended data for all analyses, including laboratory QA/QC evaluation, chain of custody documentation, and field forms. Phase I reports, where prepared, will follow ASTM E1527-13 and Phase II reports will be prepared following guidance at ASTM E1905-11.

Field personnel will maintain a field log to record all pertinent activities associated with all sampling activities. Any photographic documentation will also be recorded in the field log,

as will documentation of any field problems and corrective measures taken. Additional field documents will include sketch maps, borehole logs, and chain of custody records (COCs).

Labels generated by the laboratory will be affixed to sample containers and completed by field personnel. The labels will identify sample numbers, dates and times collected, and requested analyses. Chain of custody records will be maintained for all samples from the time of collection through the time of submittal to the laboratory for analysis.

Electronic project documents (including but not limited to word processing files, spreadsheets, laboratory analytical reports, project photographs, and CAD/GIS files) will be stored for a minimum of five years in an electronic project folder on a local server in the IHI/Terracon office that is backed up automatically on a daily basis to a mainframe at Terracon's corporate office in Olathe, Kansas. In addition, all analytical reports and chain-of-custody records will be maintained indefinitely on the analytical laboratory's LIMS database, and made available via the laboratory's secured online data access system.

Samples will be submitted to the laboratory, using standard turnaround times unless alternate turnaround times are requested on chain of custody records for individual sample sets. It is anticipated that ESC Laboratories (ESC) will be used for all analyses; ESC is certified with the State of Utah. If another laboratory performs analyses, it must meet the following criteria and submit all QA/QC documentation to the EPA for approval as described above:

- Demonstrated ability to achieve the required detection limits;
- Certified by the State of Utah for the specific analyses;
- Ability to meet the project's analytical QC requirements, which includes a laboratory method blank, laboratory control sample, matrix spike and matrix spike duplicate performed on one of the project's samples, chromatograms, and narrative report of QC results and any corrective actions required; and
- Follows an internal QA/QC Program.

Details of the laboratory QA/QC Program are presented in **Appendix A**.

GROUP B MEASUREMENT/DATA ACQUISITION

B1 Sampling Process Design

Site-specific SAPs will be developed to include each site selected for Phase II investigation. Regulatory and historical data collected during the Phase I ESA, a visual inspection of the property, and any change in use since the Phase I ESA was conducted will be used to develop the SAPs. Each SAP will be reviewed and approved by the Agencies prior to implementation.

B2 Sampling Methods Requirements

All samples will be collected following IHI Standard Operating Procedures (SOPs) included in **Appendix B.** The SOPs include lists of equipment needed for each SOP, and were developed in general accordance with *Guidance for Preparing Standard Operating Procedures (SOPs) (QA/G-6)* (*U.S. EPA, April 2007)*. If problems develop in the field during implementation of an SOP, field personnel will contact the QA/QC leader for information on appropriate corrective action, and the problem and corrective action will be documented in the field log book.

B3 Sample Handling, Preservation and Custody Requirements

Samples will be identified, labeled, preserved, and handled following **SOP 20**, which includes chain of custody and documentation procedures. An example sample label and chain of custody form are included as attachments to SOP 20.

Required sample containers, sample volumes, sample holding times, and sample preservation methods for a variety of analytical parameters including those that are likely to be used in the assessments are summarized in Table 14.6 of Appendix III to the ESC Quality Assurance manual (Appendix A of this QAPP). The primary analytical parameters anticipated for the assessments include, but are not limited to, the following: volatile organic compounds (Method 8260); semivolatile organic compounds (Method 8270); total petroleum hydrocarbons – gasoline and diesel range organics (Method 8015); oil & grease (Method 1664); and metals (Methods 6010/7470/7471).

Samples will be placed into the appropriate laboratory-provided container immediately after collection. The container will remain in the sight of the sampler or will be locked in a secured area until the samples are transported under chain of custody protocols for delivery to the laboratory.

B4 Analytical Methods Requirements

All analytical methods will follow standard EPA procedures as outlined in Test Methods for Evaluating Solid Wastes - Physical/Chemical Methods (SW-846) as updated. Please refer to SW-846 and the ESC Quality Assurance Manual (Appendix A of this QAPP) for analytical SOPs and information regarding analytical equipment, instrumentation, performance criteria, corrective action procedures and documentation, sample disposal, and method validation information and procedures for nonstandard methods. Laboratory turnaround times needed will be specified on chain of custody records for each sample set, and will typically be the standard ESC turnaround time of 7 working days.

B5 Quality Control Requirements

B5.1 Definitive Data

To ensure that high quality, reliable data are consistently collected, and that data are comparable to previous investigations, QA procedures will be followed throughout the investigation. Quality assurance procedures include using the data quality objectives, following SOPs, and collecting and analyzing field and laboratory quality control (QC) samples.

All QC samples collected in the field will be preserved, handled, and transported in an identical manner as the environmental samples.

Quality control samples will include the following:

- Field duplicates
- Field/Equipment blanks
- Matrix spikes and matrix spike duplicates (MS/MSDs)

- Laboratory method blanks
- Laboratory control samples (LCS)

Quality control samples are briefly described below.

Field Duplicate Samples. To evaluate sampling and laboratory precision, field duplicate samples may be collected, as specified in the site-specific SAP. One sample set will be labeled with the correct sample identification, while the other will be labeled with a false or "blind" sample identification. When required, the relative percent difference (RPD) between detected analytes in the field sample and its duplicate are calculated, using the following equation.

$$RPD = \frac{X_1 - X_2}{\left(\frac{X_1 + X_2}{2}\right)} x100$$

Where X_1 and X_2 are the reported concentrations of the samples being evaluated.

The target RPD for samples and their duplicates will be ±20%, assuming that the reported concentrations are greater than approximately 5 times the practical quantitation limit (PQL). If samples exceed ±20% RPD, the data will be flagged and evaluated by the QA/QC Officer. The samples may be used if the reported concentrations are less than 5 times the PQL, and may be used on a conditional basis if sample heterogeneity or matrix interference appears to be the cause of the high RPD value.

Field/Equipment Blank. Field equipment blanks may be collected, as specified in the site-specific SAP. Acceptance criteria will be less than the laboratory reporting limit (LRL). If above the LRL, the QA/QC Officer will evaluate the data in the sampling set and the data will be flagged for the contaminant. The QA/QC Officer will review the sampling procedures and equipment to determine if contaminants could have been introduced by the sampling methodology. When necessary, the results will be discussed with the Agencies, laboratory personnel, and/or appropriate regulatory officials to determine if the data are acceptable or should be rejected.

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Samples. Samples for MS/MSD analysis will be selected by the laboratory from the sample set at random and split in the

laboratory. The MS/MSD samples will be spiked in the laboratory with target analytes prior to extraction or analysis, according to the laboratory's SOPs, and then analyzed for the same compounds as the environmental samples. Each MS/MSD will be evaluated for Percent Recovery (PR). If the data meets the PR criteria, the MS/MSD will be evaluated for RPD according to the equation and standards presented above.

Percent Recovery = $\frac{X_s - X_i}{SC} x100$ Where X_s = concentration measured in spiked sample
X_i = concentration measured prior to spiking, and
SC = spike concentration

The PR acceptance criteria are 70 - 130% for MS/MSD samples and ±20% RPD. If data fail to meet the acceptance criteria, the QA/QC Officer will evaluate the data with the laboratory to determine potential causes of failure, such as matrix interference or sample heterogeneity. Data may be flagged or invalidated based on discussions with the laboratory.

Laboratory Method Blanks. Method blank samples will be prepared by the laboratory and analyzed with each analytical batch for each method. A method blank consists of laboratory-grade deionized water or solid that is processed through all of the analytical steps required by a method, including sample extraction, preparation, and spiking. Laboratory method blank samples are used to identify contamination originating in the laboratory, such as laboratory water, reagents, sample preparation steps, and instrument contamination. Method blank samples aid in distinguishing low-level field contamination from laboratory contamination. Method blank samples will be run with each batch of samples (20 or fewer samples per batch). If analytes are detected in the method blank, the laboratory will correct problems as per their standard operating procedure.

Laboratory Control Samples (LCS). Laboratory control samples are used to evaluate laboratory accuracy in the absence of matrix interference. A laboratory control sample is composed of laboratory-grade deionized water or clean solid that is spiked with target analytes according to the laboratory's SOPs prior to extraction or analysis. The percent recovery of the spiked compounds is calculated and compared to established QC limits using the following formula.

Percent Recovery = $\frac{X_S}{SC} x100$ Where X_s = concentration measured in spiked sample, and SC = spike concentration

Acceptance criteria for the LCS are 85 - 115%. If the LCS is out of control, the laboratory will correct problems as per their standard operating procedures.

Holding Times. Holding times are used to evaluate the representativeness of the environmental samples. Holding time is the period following sample collection when a sample is considered representative of the environmental conditions. The holding time for each analysis will be compared to the method-specific holding times. Samples held beyond their holding time prior to analysis will be rejected.

B5.2 Non-definitive data

Non-definitive data will be collected following Standard Operating Procedures. The QC documentation is not as rigorous as requirements for definitive data, as the data may be used for site characterization.

B6 Equipment Testing, Inspection, and Maintenance Requirements

Testing, inspection, and maintenance of all sampling equipment and field instrumentation will be performed by IHI/Terracon field personnel prior to each day's field use and in accordance with the procedures and schedules in the manufacturers' specifications. A supply of appropriate spare parts and batteries will be maintained with each instrument in its hard-shell transport case, along with instrument calibration supplies. Any identified deficiencies will be documented in the field log book, along with any corrective actions (e.g., spare parts replacement and instrument re-testing).

ESC conducts its own equipment testings, inspections, maintenance, and record keeping of the laboratory equipment as detailed in the laboratory's Quality Assurance Manual provided in Appendix A.

B7 Instrument Calibration and Frequency

B7.1 Field Instruments

Field instruments will be calibrated daily or in accordance with manufacturers' specifications by IHI/Terracon field personnel, using National Institute of Standards and Technology (NIST) standards or equivalent. Calibration deficiencies, if any, will be documented in the field log book along with their resolution (e.g., spare parts replacement and re-calibration).

B7.2 Laboratory Instruments

ESC's Quality Assurance Manual (QAM) and Standard Operating Procedures meet all State of Utah, The NELAC Institute, and EPA method protocols necessary to produce legally and defensible analytical data, as indicated in the Utah Environmental Laboratory Certification Program (ELCP) document. Certification also applies to instrument calibration, reference material, standards traceability, data validation, and all other aspects of the ESC's QAM.

In the event of a negative audit finding or any other circumstance, which raises doubt concerning the laboratory's competence or compliance with required procedures, the laboratory ensures that those areas of concern are quickly investigated. A resolution of the situation is promptly sought and, where necessary, recalibration and retesting is conducted. Records of events and corrective actions taken by the laboratory to resolve issues and to prevent further occurrences are maintained. Additional information on laboratory corrective actions is described in Section 4.11 of their QAM.

B8 Acceptance Requirements for Supplies and Consumables

All sample containers and other dedicated consumables will meet EPA criteria for cleaning procedures required for low-level chemical analysis. Sample containers will have Level II certification provided by the manufacturer, in accordance with pre-cleaning criteria established by EPA in "Specifications and Guidelines for Obtaining Contaminant-Free Sample Containers." The certificates of cleanliness are maintained by the container suppliers, and can be obtained upon request using the container batch and lot numbers. All sample containers and sample preservatives (where applicable) will be provided by the

laboratory. The containers shall be pre-preserved by the laboratory, if required. In addition, the laboratory will supply the laboratory-grade deionized water for the field and equipment blanks. The laboratory-grade deionized water may be prepared by the laboratory in-house, but the laboratory must have a routine procedure in place to analyze the water to ensure the deionized water's quality. New disposable nitrile sampling gloves will be used during collection of all media samples, and will be discarded after collection of each sample. New disposable water filters (if required), bailers, and/or tubing will be used to collect groundwater samples and will be discarded after use. Prior to use, the materials provided by the laboratory or other suppliers will be inspected visually for signs of tampering or contamination. No evidence of tampering or contamination will be acceptable. The field team leader will be responsible for the inspection. Reserves of all field supplies and consumables are stored and maintained in IHI's secured storage warehouse and used as needed by field personnel for each day's field activities, and the reserves of consumables are re-ordered/replenished as needed by the IHI/Terracon Environmental Department Managers.

B9 Data Acquisition of Non-direct Measurements

Additional data may be collected and used for site characterization following SOPs. QA procedures will be followed throughout the investigation. External sources of existing data may also be used (for example, computer databases or regulatory files of previously investigated sites); such information will be used only for reference in selecting individual sites for investigation. Because the validity of such data cannot be verified, this type of data will not be considered as definitive for the purpose of assessing selected sites.

B10 Data Management

The results of each investigation will be compiled and detailed in a report. Please refer to Section A9 for information pertaining to documentation that will be generated during the course of the project, and storage requirements for these records.

Data will be processed using commercially available word processing, spreadsheet, and/or database programs. During transcription of field measurements, each entry will be double-

checked immediately after each transcription from field log books and forms. Example forms for typical field data collection are included in Appendix B. To minimize potential errors in laboratory data transcription, the use of electronic data deliverables (EDDs) will be maximized during data entry to summary tables and databases. The control mechanism to detect and correct possible errors in data transcription, reduction, reporting, and data entry to forms, reports, and databases will be the senior peer review of documents by the Consultant Project Manager and QA/QC leader. Data will be stored electronically, both on a local server (subject to daily backup at a mainframe at Terracon's corporate office) and on the laboratory's LIMS database system, and can be retrieved via the local server and via the laboratory's secured online data access system. Please refer to Appendix A (ESC Quality Assurance Manual) for information relating to procedures used and individuals responsible for laboratory data processing, transmittal, storage/archival, and hardware/software configurations.

GROUP C ASSESSMENT/OVERSIGHT

C1 Assessment Activities

Assessment and oversight activities will be conducted by IHI's QA/QC Officer. There will be three primary activities conducted by the QA/QC Officer:

1) Surveillance Level Oversight

The Consultant Project Manager will coordinate the investigation, with independent oversight by the QA/QC Officer. Both of these individuals will have authority to stop work in the event of unsafe work conditions or deviation from SOPs. In the event of unsafe work conditions, field personnel will also have authority to stop work and will immediately contact the Consultant Project Manager for resolution. Any deviations from the QAPP will be addressed immediately to ensure the quality of the data. Surveillance level oversight will be conducted throughout the duration of field activities.

2) Performance Evaluations

The QA/QC Officer will verify that the laboratory certifications and methods are current and approved by the NELAP, prior to the initiation of field sampling.

3) Data Quality Validation Summary

Reviews of all data collected during the investigation will be conducted by the QA/QC Officer to determine whether DQOs were met and evaluate the overall usability of the data. These reviews will be conducted within approximately one week of receipt of analytical data sets from the laboratory. The results of these reviews will be documented in the form of QA status reports to the Consultant Project Manager, who will immediately notify the laboratory if any need for corrective actions is identified. In this case, the laboratory will be required to perform, verify any corrective actions taken, which will then be documented with an updated QA status report by the Consultant Project Manager.

C2 Reports to Management

QA status reports (see C1-3 above) will be provided by the QA/QC Officer to the Consultant Project Manager, who will provide copies to the RDA if corrective actions are needed or if requested by RDA. Copies of all QA status reports will be included with the final reports detailing the investigations. Copies of the final reports detailing the investigations will be sent to all parties listed in Section **A3 Distribution List**.

GROUP D DATA VALIDATION AND USABILITY

D1 Data Review

Upon receipt of the laboratory analytical results, the data will be forwarded to the QA/QC Officer for review which will include initial screening to evaluate whether any of the data is flagged or if laboratory control limits were not met. Upon acceptance of the data from the laboratory, the data will be validated. The data validation process evaluates whether the specific requirements for an intended use have been fulfilled and ensures that the results conform to the users' needs.

D2 Validation and Verification Methods

All laboratory data will be subject to internal reduction and validation by the laboratory prior to external release of the data, as detailed in Sections 5.11 and 5.12 of the laboratory's QAM.

Upon receipt of data released by the laboratory, additional data validation and verification will be conducted by the QA/QC Officer, using the criteria described in Section B5.1 and **Table 2,** and including review of chain of custody and laboratory log-in records. Data will be reviewed as it is received throughout the project. Each laboratory data set will be provided by the laboratory as a Level III data package which will include the final analytical report with qualifiers where necessary; chain of custody (COC) forms; method blanks; matrix spike/matrix spike duplicate (MS/MSD) summary with control limits; laboratory control sample (LCS) summary with control limits; reporting limits listed on all reports; surrogate recoveries for GC and GC/MS analyses; initial and continuing calibration information; and instrument blank performance.

Laboratory QC issues will be addressed by communication between the QA/QC Officer and laboratory personnel. Problems identified in sample collection, handling, preservation, and documentation will be addressed with the Project Manager and field staff.

Any deviations from the QA goals will be evaluated in terms of their effect on data usability. The degree of sample deviation beyond the acceptance limit will be evaluated for its potential effect on data usability, contribution to the quality of the reduced and analyzed data, and on decision-making for the project. The completeness goal for the project is 90 percent valid data.

D3 Reconciliation with User Requirements

Following the validation of field and laboratory data, all data and information will be reconciled with the project objectives to assess the overall success of sampling activities. Qualitative DQOs will be reviewed through a narrative discussion of the results to including limitations, if any, on data use due to uncertainties posed by any flagged data or elevated laboratory reporting limits.

GROUP E REFERENCES

U.S. Environmental Protection Agency. *Guidance for Preparing Standard Operating Procedures (SOPs) (QA/G-6)*. EPA/600/B-07/001, April, 2007

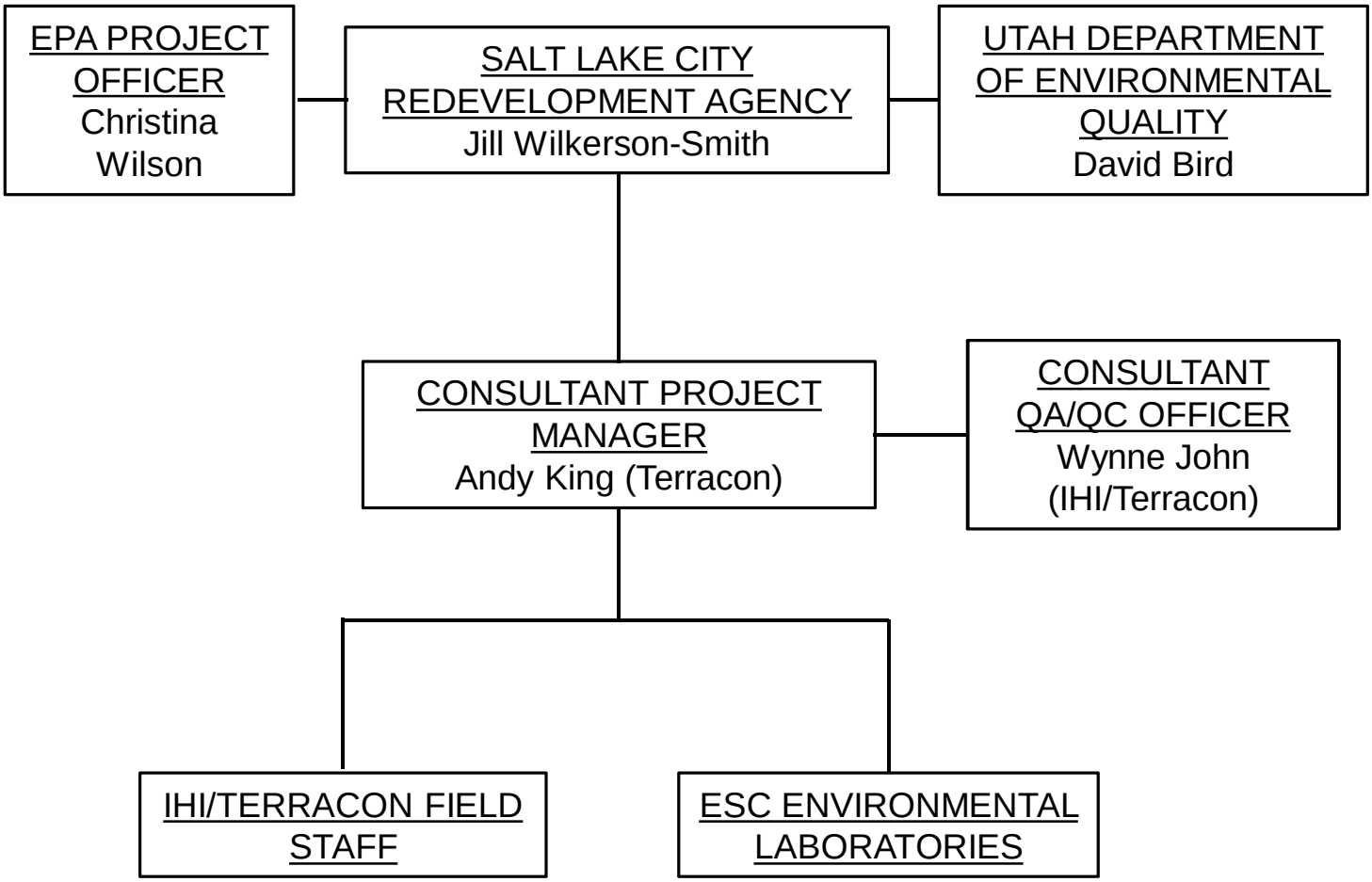
U.S. Environmental Protection Agency. *Data Quality Assessment: A Reviewer's Guide (QA/G-9R)*. EPA/240/B-06/003, February, 2006.

U.S. Environmental Protection Agency. *Data Quality Assessment: Statistical Tools for Practitioners (QA/G-9S)*. EPA/240/B-06/002, February, 2006.

U.S. Environmental Protection Agency. *Guidance for Quality Assurance Project Plans (QA/G-5)*. EPA/240/R-02/009, December, 2002.

U.S. Environmental Protection Agency. *Guidance on Systematic Planning Using the Data Quality Objectives Process (QA/G-4)*. EPA/240/B-06/001, February, 2006.

U.S. Environmental Protection Agency. *The Interim Final Guidance on Data Quality Objectives.* Pub. No. 9355-9-01, September, 1993.



Project No: AL127481 Project Mngr: ARK Drawn By: ARK Date: 02/12/2014	IHI Environmental, A Terracon Company	Terracon Consulting Engineers & Scientists 640 East Wilmington Avenue Salt Lake City, Utah 84106	**PROJECT ORGANIZATION CHART** **North Temple Brownfields Assessment** **North Temple Street Corridor** **Salt Lake City, Utah** **The Redevelopment Agency of Salt Lake City**	**FIGURE** **1**

Table 1
Data Quality Indicators (DQIs)

Parameter	QC Program	Evaluation Criteria	Summary of QA/QC Goals
Precision	Field Duplicate Pairs	RPD[a]	RPDs for soil and groundwater samples will be less than ± 20% when detected concentrations are ≥ 5x the LRL. When detected concentrations are < 5x the LRL, the RPD limit will be ± the LRL
Bias	Laboratory Control Sample	Percent Recovery[b]	LCS percent recoveries will be between 85-115%
	Matrix Spike/Matrix Spike Duplicate (MS/MSD)	Percent Recovery[b] RPD[a]	MS/MSD percent recoveries will be between 70-130% RPDs for MS/MSDs will be ± 20%
Accuracy[c]	Method Blanks	LRL	Less than LRL
	Equipment Blanks	LRL	Less than LRL
Representativeness	Standard Operating Procedures (SOPs)	Qualitative determination of SOP adherence	All samples collected following SOPs
	Holding Times	Holding Times	All samples analyzed within holding times
	Field/Equipment Blanks	LRL	Less than LRL
Comparability	Units of Measure	Metric Units	100% of sample results reported in same units
	Analytical Methods	Approved Methods	100% of samples analyzed using approved methods
	Standardized Sampling	Qualitative determination of SOP adherence	All samples collected following SOPs
	QC Samples		
	10% Field Duplicates	Verify	100% compliance
	10% Field Blanks	Verify	100% compliance
	Lab QA	Verify	100% compliance
Completeness	Complete Sampling	Percent Valid Data	90% valid data
Sensitivity	Sample analyses	LRL	100% of LRLs are less than Performance Standards

a: RPD = $\frac{X_1 - X_2}{\left(\frac{X_1 + X_2}{2}\right)} x100$; where X_1 and X_2 are the reported concentrations of the samples being evaluated.

b: Percent Recovery = $\frac{X_s - X_i}{SC} x100$; where X_s = concentration measured in spiked sample, X_i = concentration measured prior to spiking, and SC = spike concentration.

c: Instrument calibration, reference material, standards traceability, and data validation will follow ESC's Standard Operating Procedures.

LRL - Laboratory Reporting Limit
RPD - Relative Percent Difference
SOP - Standard Operating Procedure

Table 2
Data Validation and Verification Methods

Data Validation and Verification Requirements	Data Validation and Verification Methods
• Samples were collected as per scheduled locations and frequency.	• Comparison with Site Monitoring Plan.
• Sample collection and handling followed specific procedures (i.e., relevant SOPs and chain of custody procedures).	• Review of field notes, sampling logs and COCs. • Surveillance-level oversight of field procedures to maximize consistency in field.
• Appropriate analytical methods were used, and internal laboratory calibration checks were performed according to the method-specified protocol.	• Review of analytical methods and case narratives provided with laboratory reports. • Maintain documentation of communications with laboratory regarding problems or corrective actions.
• Required holding times and laboratory reporting limits were met.	• Comparison with specified holding times and LRLs.
• Recovery acceptance limits for field and laboratory QC samples (MS/MSD, LCS, and method blanks) were met.	• Comparison with specified acceptance limits. • Comparison with Data Quality Indicators.
• Appropriate steps were taken to ensure the accuracy of data reduction, including reducing data transfer errors in the preparation of summary data tables and maps.	• Maintaining a permanent file of hard copies of laboratory analytical reports. • Minimizing retyping of data. • Double-checking values entered into database, tables, and maps against laboratory reports.

APPENDIX A

ESC Laboratories Quality Assurance Manual

Quality Assurance Manual

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The ESC Lab Sciences Quality Assurance Manual is a living document. It is reviewed at least annually and revised when needed. The information stated herein is subject to change at any time due to updates to QC Limits, methods, operations, equipment, staff, etc. At the time of distribution the requestor will receive the most recent version of the manual and will be assigned a control number. The control number will help ESC to track what version is sent. The revision number is stated on the cover page of the manual.

Expiration

This manual expires 1 year from the date listed at the front of the manual on the “Approvals” page. If you have a copy that is not dated within this time period, please contact the laboratory and obtain the most recent version.

COMPREHENSIVE QUALITY ASSURANCE MANUAL

for

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The ESC QAM has been prepared in accordance with the following standards: AIHA (LQAP), A2LA (Env. Prog. Req.), ANSI/ISO 17025-2005, NELAC , DOD QSM.

Quality Manual: Table of Contents

Tables and Figures

1.0 GENERAL

1.1 INDEX AND REVISION STATUS

The numbering of this quality manual corresponds directly to the numbering of ISO 17025:2005 with cross-references to the 2003 National Environmental Laboratory Accreditation Conference (NELAC) Standard and the 2009 standard of The NELAC Institute (TNI).

This quality manual is only valid if all pages are at the same issue level as shown in the index of the quality manual.

Updates to this manual are made by re-issuing the relevant section of this manual and adapting the issue level in the index. New version numbers are assigned upon revision.

NOTE: This manual expires 1 year from the date listed at the beginning of the manual on the "Approvals" page.

1.2 PURPOSE

This quality manual documents the laboratory's management system and demonstrates the ability to execute the indicated tests and/or procedures and to meet regulatory requirements.

This manual establishes compliance with ISO (International Organization for Standardization) 17025, NELAC, Department of Defense Quality Systems Manual (DOD QAM), and the American Industrial Hygiene Association (AIHA).

2.0 LABORATORY BACKGROUND

2.1 ACTIVITIES

2.1.1 Analytical Support and Service Areas

ESC Lab Sciences is an environmental analytical firm providing technical and support services to clients nationwide. Specific service areas include the following:

- drinking water analysis
- industrial wastewater analysis
- hazardous waste characterization and identification
- groundwater analysis
- air analysis
- regulatory document guidance
- biological assessments
- mold identification
- solid/soil analysis and characterization
- industrial hygiene/environmental lead

2.1.2 Regulatory Compliance and Quality Standards

ESC is devoted to providing reliable and accurate data recognizing the necessity to establish sound, objective, and legally defensible positions or opinions for clients regarding compliance with governing regulations. ESC maintains quality systems that are compliant with the following Quality Standards: AIHA LQAP, A2LA, ANSI/ISO 17025, NELAC, DOD QSM. The effectiveness of the quality system is measured by internal and external audits, management review meetings, internal error logs and an active preventive and corrective action system.

2.1.3 Analytical Capabilities:

Where mandated, only approved EPA procedures are used for environmental analyses. ESC utilizes a number of method sources to accomplish project requirements. For NPDES and SDWA, methodologies are taken directly from 40 CFR parts 136 and 141.

For industrial hygiene analytical procedures, ESC utilizes guidance from NIOSH and OSHA published methods.

The following list is an example of the methodology ESC routinely performs:

Routine Methodology and Programs	
PROGRAM	***METHOD SOURCE***
NPDES	***EPA 821/R-93-010-A*** *Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater, Volume I. Revision 1, August 1993.*
	EPA 821/R-02-019 *Method 1631, Revision E: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry. August 2002.*
	40 CFR part 136
	Methods for Chemical Analysis of Water and Wastes (March 1983)
	Standard Methods for the Examination of Water and Wastewater (18^{th}, 19^{th}, 20^{th} editions)
AQUATIC TOXICITY	*7-Day Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test; Test Method 1000.0 from "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA 821-R-02-013).*
	3-Brood Ceriodaphnia dubia Survival and Reproduction Test; Test Method 1002.0 from "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA 821-R-02-013).
	Fathead Minnow (Pimephales promelas) Acute Toxicity Test (24, 48 or 96 hour duration); referenced in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA 821-R-02-012, 10-02).
	Ceriodaphnia dubia Acute Toxicity Test (24, 48 or 96 hour duration); referenced in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA 821-R-02-012, 10-02).
SDWA	40 CFR parts 141
	Methods for Chemical Analysis of Water and Wastes (March 1983)
	Standard Methods for the Examination of Water and Wastewater (18^{th}, 19^{th}, 20^{th} editions)
	Methods for the Determination of Organic Compounds in Drinking Water - EPA/600/4-88/039 - December 1988 (Revised July 1991)
	Methods for the Determination of Organic Compounds in Drinking Water Supplement I, EPA/600/4-90/020 - July 1990
	Methods for the Determination of Organic Compounds in Drinking Water Supplement II, EPA/600/R-92/129 - August 1992
	EPA. Method 1623: *Cryptosporidium and Giardia in Water by Filtration/IMS/FA, December 2005.*
RCRA	*SW-846, Test Methods for Evaluating Solid Wastes (3^{rd}, 4^{th} and online editions)*
IH	*NIOSH Manual of Analytical Methods (4^{th} edition) & OSHA Sampling and Analytical Methods (online)*

Routine Methodology and Programs	
PROGRAM	***METHOD SOURCE***
AIR	*Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*
	Emission Measurement Center (Air Emissions Methods)
	NIOSH Manual of Analytical Methods (4th edition)
	Journal of Chromatographic Science, Vol. 36, May 1998.
CLP	*USEPA CONTRACT LABORATORY PROGRAM - STATEMENT OF WORK* FOR ORGANICS ANALYSIS Multi-Media, Multi-Concentration OLM04.3
	USEPA CONTRACT LABORATORY PROGRAM - STATEMENT OF WORK FOR INORGANIC ANALYSIS Multi-Media, Multi-Concentration ILM05.3
MOLD	*American Industrial Hygiene Association*
	NIOSH Manual of Analytical Methods (4th edition)
Miscellaneous	*American Society for Testing and Materials (ASTM)*
	State Specific Methodologies from the following: *Florida, Oregon, Iowa, Washington, Texas, Arizona, Massachusetts, North Carolina, Louisiana, Missouri, Kansas, Wisconsin, Ohio*
Miscellaneous	*Analytical Methods for the Determination of Pollutants in Pharmaceutical Manufacturing Industry Wastewater, Revision A EPA-821-B-98-016 - July 1998 (Approved at 40 CFR Part 136, Not Approved at Part 141)*

2.2 HISTORY

ESC Lab Sciences was founded in 1970 by Dr. Arthur Schulert, a professor of Biochemistry at Vanderbilt University Medical School. The laboratory's first location was a 2,000 square foot building located in Mt. Juliet, TN.

ESC initially conducted several research contracts for the National Science Foundation. EPA Clean Water and Safe Drinking Water legislation of the early 1970s provided an additional market of Tennessee utilities and industries. ESC grew slowly for several years by increasing the share of the drinking and wastewater markets in Tennessee. In the late 1980s, ESC expanded its capabilities to include Underground Storage Tank testing and Biomonitoring/Toxicity testing.

Strategic expansion of the laboratory allowed ESC to provide support to large RCRA sites and add capabilities to offer analytical support for air and mold analyses. ESC is currently the nation's largest, single-location environmental laboratory and is the only laboratory facility certified/approved to operate in all US states. Our staff of over 250 employees works out of our 87,000 square feet, nine-building facility approximately 20 minutes east of Nashville International Airport.

3.0 INTRODUCTION, SCOPE, AND DEFINITIONS

3.1 SCOPE OF CAPABILITIES

A list of approved and certified analytical capabilities can be found at the end of this section in Table 3.3b.

3.2 TABLE OF CONTENTS, REFERENCES AND APPENDICES

The table of contents is found at the beginning of this Manual. This *Quality Manual* uses the references from the 2003 NELAC Standard, Chapter 5, Appendix A.

3.3 DEFINITIONS AND TERMINOLOGY

The quality department is responsible for establishing and maintaining a list of definitions and conventions.

Table 3.3a Definitions

TERM	***DEFINITION***
Acceptance Criteria (Analytical QC Limits)	Specified limits placed on characteristics of an analytical process as defined in analytical methodology or guidance.
Accuracy	The amount of agreement between an observed value and an accepted reference value. Accuracy is represented as percent recovery.
Analytical Reagent Grade	Designation for the high purity of certain chemical reagents and solvents assigned by the American Chemical Society.
Analytical Sensitivity	The lowest concentration that can be detected by the method. (e.g., for methods involving a count = 1 raw count calculated to the reporting units). Analytical sensitivity is commonly used in Mold analysis.
Batch Analysis	Analysis of 1 – 10 or 20 samples, depending on the published method requirements, including all required QC. When there are 21 or more samples to be analyzed, the QC criteria for the next 20 samples is the same as it is with a single batch.
Batch	1 – 10 or 20 samples, depending on the published method requirements. A group of samples that behave similarly and are analyzed as a unit.
Bias	The systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value).
Blank	See FIELD, TRIP, METHOD, EQUIPMENT
Blind Sample	A sample submitted for analysis with a composition known only to the individual requesting the analysis. The analyst/laboratory may know the identity of the sample, but not its composition. It is used to verify the analyst or laboratory's proficiency in the execution of the analytical measurement process.

Table 3.3a Definitions	
Calibration	To determine, by measurement or comparison with a known standard, the correct value of each scale reading on a meter or other device, or the correct value for each setting of an instrument control. The levels of the applied calibration standard should bracket the range of planned or expected sample measurements.
Calibration Curve	The graphic representation of the relationship between the known values, such as concentrations of a series of calibration standards and instrument responses.
Calibration Factor	The ratio of the detector response (peak areas or peak heights) to the amount (mass) of analyte in the calibration standard. $$CF = \frac{A_s}{C_s}$$ where: A_s - Average Peak Area over the number of peaks used for quantitation C_s – Concentration of the analyte in the standard.
Continuing Calibration Blank (CCB)	The CCB is used to confirm the absence of contaminants within the analytical system prior to and during the analysis of field samples. The CCB must be <½ RL, concentrations of common laboratory contaminants cannot exceed the reporting limit. The CCB is analyzed at regular intervals within a batch and is typically utilized in Metals analyses.
Continuing Calibration Verification (CCV)	A standard, usually near the mid-point of the calibration curve, made from the primary stock used for the calibration curve. The CCV is used to verify the calibration stability of the instrument and must perform within method stated criteria, which is usually ±10 to 15%. The CCV must be analyzed at regular intervals within a batch.
Continuing Demonstration of Capability (CDOC)	Continuing Demonstration of Capability – Annual* verification of analyst skill. *unless required more frequently by program or method
Chain of Custody	A record that documents the possession of the samples from the time of collection to receipt by the laboratory. This record generally includes: the number and types of containers, the mode of collection; collector ID; time of collection; preservation; and requested analysis.
Corrective Action	An action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence.
Data Quality Objective (DQO)	A statement of the overall level of uncertainty that a data user is willing to accept in results derived from analytical data.
Duplicate	Second aliquots of field samples carried through the entire preparation and analytical process that are used as an indication of sample precision or consistency in the field sample matrix.
Equipment Blank	A sample of analyte free water (usually laboratory deionized water) which has been used to rinse the sampling equipment. It is collected after decontamination procedures but prior to sampling. The purpose is to demonstrate complete decontamination of the equipment.

Table 3.3a Definitions	
External Calibration Model	Comparison of instrument responses from the sample to the responses from the target compounds in the calibration standards. Sample peak areas (or peak heights) are compared to peak areas (or heights) of the corresponding analytes in calibration standards.
Field Blank	A sample of analyte free water (usually laboratory DI) is poured into the appropriate collection vessel and preserved according to method guidelines. The purpose of the field blank is to serve as a check on reagent and environmental contamination.
Initial Calibration Verification (ICV) See also SSCV	An independently prepared standard used to verify the accuracy of the initial calibration (for ongoing calibration). The ICV is used to represent the calibration efficiency of the instrument and must perform within method stated criteria, which is usually ±10 to 15%. An initial calibration curve is verified using a secondary source if one is available.
Initial Demonstration of Capability (IDOC) See also CDOC	A demonstration of capability (DOC) must be made prior to using any analytical method and any time there is a change in instrument type, personnel or testing method. Such performance must be documented and the four preparation batches following the change in personnel must not result in the failure of any batch acceptance criteria, e.g., method blank and laboratory control sample, or the demonstration of capability must be repeated.
Instrument Detection Limit (IDL)	IDL is the smallest signal above background noise that an instrument can reliably detect.
Interference Check Sample (ICS)	A series of two solutions, used in ICP and ICPMS analysis, to verify that inter-element interferences are compensated for correctly. This standard is referred to as the Spectra Interference Check (SIC) in EPA Method 200.7 ICSA – A solution containing only the interfering analytes at high concentrations. ICSAB – A solution containing interferents plus other method analytes at the level of concern, which corresponds to the project specific action limits. ICSA and ICSAB provide and adequate test of inter-element correction (IEC) factors.
Internal Calibration Model	Internal standard calibration involves the comparison of instrument responses from the target compounds in the sample to the responses of specific internal standard analytes added to the sample or sample extract prior to injection.
Internal Standards	Analytes not expected to occur naturally in field samples that are spiked to provide a consistent basis for comparison with target analytes. ISTDs are used in internal calibration models.

Table 3.3a Definitions

Laboratory Control Sample (LCS) - 2ND Source	A known matrix is spiked with known amounts of the analyte(s) of interest used to verify the efficiency of the analytical system without interference from the sample matrix. The LCS provides the best estimate of analytical system accuracy and may also be used to verify the validity of the on-going calibration. The LCS is a secondary source if one is available. The LCS matrix must closely represent the matrix of the sample batch and undergo all preparations required by the method prior to analysis. The following list are acceptable matrices for the LCS: ***Batch Matrix*** — ***LCS Matrix*** Water — Laboratory DI water Soil — Spiked Ottawa sand or Glass beads or commercially prepared LCS in a soil matrix Paint Chips — Laboratory prepared paint chip/lead mixture; Commercially prepared & certified paint chip LCS Filters/Sorbent Media/Dust Wipes — Unused Industrial Hygiene sampling media that represents the substrate submitted by the client. Where possible, the media should be the same lot as that of the field samples.
Limit Of Detection (LOD)	The lowest concentration that can be determined by a single analysis to be statistically different from a blank, within a defined level of confidence. This concentration is recommended to be three standard deviations above the measured average difference between the sample and blank signals, which corresponds to the 99% confidence level. In practice, detection of an analyte by an instrument is often based on the extent to which the analyte signal exceeds peak-to-peak noise (Keith et al. 1983). Samples that do not bear residues at or above the LOD are referred to as non-detects (ND).
Limit of Quantitation (LOQ)	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The LOQ may be equal to the RL, MRL, or PQL. Routinely the PQL/LOQ is at least 3-5 times the statistically derived MDL/LOD.
Linear Dynamic Range (LDR)	In Inorganic analyses, the LDR is defined as the concentration range where absorbance and concentration remain directly proportional to each other. A wide linear dynamic range permits the analysis of a wide range of sample concentrations (optical densities) and reduces sample preparation (dilution) requirements.

Table 3.3a Definitions	
Matrix	The component, or substrate, which contains the analyte of interest. For purposes of batch determination, the following matrix types are used: • *Aqueous:* Any aqueous sample excluded from the definition of a drinking water matrix or saline/estuarine source. Includes surface water, groundwater, and effluents. • *Drinking Water:* Any aqueous sample that has been designated as a potable or potentially potable water source. • *Saline/Estuarine:* Any aqueous sample from an ocean or estuary, or other saltwater source, such as the Great Salt Lake. • *Non-aqueous Liquid:* Any organic liquid with <15% settleable solids. • *Biological Tissue:* Any sample of a biological origin such as fish tissue, shellfish or plant material. Such samples are grouped according to origin. • *Solids:* Includes soils, sediments, sludge and other matrices with >15% settleable solids. • *Chemical Waste*: A product or by-product of an industrial process that results in a matrix not previously defined. • *Air Samples:* Media used to retain the analyte of interest from an air sample such as sorbent tubes or summa canisters. Each medium is considered as a distinct matrix. • *Solids (Other than defined above):* Includes filters, dust wipes, sorbent tubes, paint chips.
Matrix Spike (MS)	A separate aliquot of field sample spiked with a known amount of the target analyte. Accuracy is determined by comparing the recovery of the spike added to the known concentration in the sample divided by the expected analyte concentration. $$PercentSpikeRecovery = \frac{O_i - O_s}{T_i} X\ 100$$ O_i = observed sample concentration with the spike added O_s = the observed value for the sample without the spike $$T_i = \frac{Spike\ Concentration\ \text{in}\ (mg/L)\ X\ Volume\ \text{of Spike in}\ (ml)}{Volume\ of\ Sample\ in\ (ml) + Volume\ of\ Spike\ in\ (ml)}$$ T_i = True value of the spike added
Matrix Spike Duplicate (MSD)	The second aliquot of the field sample spiked as the matrix spike and carried through all sample preparation/analytical steps. The MS/MSD pair are spiked with identical amounts of the target analyte and precision is calculated based on the results.
Method Detection Limit (MDL)	The minimum concentration of a substance that can be analyzed with 99% confidence that the analyte concentration is greater than zero. MDLs are performed in conjunction with 40CFR 136, Appendix B. The MDL is the absolute minimum level of reporting that is allowed. Values reported between the MDL and RL are flagged with a "J" qualifier.

Table 3.3a Definitions	
Method Blank	A laboratory produced blank is carried through each step of the analytical procedure for each batch of samples. Method blanks are prepared for each preparation method and matrix (i.e., solids assay, dissolved metals, TCLP extraction, etc.) and are used to confirm the absence of contaminants within the preparation and/or analytical system prior to and during the analysis of field samples.
Negative Control	Measures taken to ensure that an analytical process, its components, or the environment do not cause adverse effects or lead to incorrect quantitation.
Percent Recovery	A comparison between the observed value and the true value of a known spiked concentration, represented as a percentage. This evaluation applies to the calculation of ICV, CCV, LCS, MS/MSD, Surrogates, etc. and is calculated as follows: $\%\ \text{Recovery} = \left[\frac{\text{Observed Value}}{\text{True Value}}\right] \text{X}\ 100$
Positive Control	Measures taken to ensure that an analysis and/or its components are working properly and producing correct or expected results.
Post Digestion Spike	In metals analysis, a standard prepared from a previously analyzed spiked sample digestate that yielded reduced recovery for the target analyte due to a suspected matrix interferent.
Practical Detection Limit (PDL)	An in-house protocol that is used to determine a practical and real number for method detection. This is not a statistically derived number. It is a verified number that is validated using a 20% coefficient of variation.
Practical Quantitation Limit (PQL) ***See also Reporting Limit (RL)***	Generally, the lowest standard of the calibration curve. The PQL, or RL, is defined as the lowest level that can be reliably achieved within the established limits of precision and accuracy during routine laboratory operating conditions. The PQL is the default reporting limit (RL) when no other limits are required by the project. The PQL is usually a factor of 3-10 times greater than the determined MDL. The value of the PQL changes with subsequent sample dilutions and final volumes. The multiplier (dilution) of the sample is applied to the PQL for reporting. Values reported between the MDL and PQL are flagged with a "J" qualifier.
Precision	The agreement between 2 or more duplicate measurements. There is no assumption of the true value of the sample. Precision is expressed as RPD (Relative Percent Difference).
Proficiency Testing	The action of providing controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results in comparison to peer laboratories and the collective demographics and results summary of all participating laboratories.
Qualifier	A general explanation associated with deviations from established method criteria for a given analyte. The qualifiers are alpha-numeric designations that are related to specific comments. (i.e. J1 - "Surrogate recovery limits have been exceeded, values are outside of upper control limits.")
Quality Assurance	A plan for laboratory operation that specifies the measures used to produce data of known precision and bias.
Quality Control	A set of measures within a sample analysis methodology to assure that the process is operating from a controlled analytical system.

Table 3.3a Definitions	
Reference Material	A material or substance in which one or more properties are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.
Reference Toxicant	The toxicant used in aquatic toxicity analyses to indicate the sensitivity of a test organism and to demonstrate the laboratory's ability to perform the procedure correctly and obtain consistent results.
Replicate Sample	The analytical measurement of a sample that has been split after it has been processed through the preparation stage. A replicate can also originate from a single sample that has been sub-sampled two or more times during the same analytical process time.
Reporting Limit (RL) See also PQL	The RL is equal to the PQL unless project specific limits are supplied/required by the client.
Relative Percent Difference (RPD)	$$RPD = \frac{\lvert Dup\ 1 - Dup\ 2 \rvert}{\left[\frac{(Dup\ 1 + Dup\ 2)}{2}\right]} X\ 100$$ The comparison of two values based on the mean of the two values. It is always reported as a positive number. The result is an assessment of precision. For sample duplication, the RPD is calculated using the actual analytical results of the field sample. LCS & MS calculations are also based on the actual sample result of spiked samples.
Response Factor (RF)	A measure of the relative response area of an analyte compared to its internal standard. The response factor is determined by the equation below, and if the calculated value meets the method guidelines it can be used to determine concentration for organic analyses. $$RF = \frac{(Conc._{IStd})(Area_{Analyte})}{(Conc._{analyte})(Area_{IStd})}$$ where: A_s = Response for analyte to be measured A_{is} = Response for the internal standard C_{is} = Conc. of the internal std.in ug/L C_s = Conc. of the analyte to be measured in ug/L.
Sample Blank	The purpose of a sample blank is to account for spectrophotometric interferences such as sample color, cloudiness, viscosity, etc. The sample blank must be analyzed at the same dilution as the sample. The sample blank is analyzed without any addition of reagents.
Selectivity	The capability of an analytical method or instrument to respond to a target substance or constituent in the presence of non-target substances.
Sensitivity	The capability of an analytical method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a property of interest.

Table 3.3a Definitions	
Secondary Source Calibration Verification (SSCV)	A mid-point or low standard made from the secondary source (lot or manufacturer) that is not used to construct the calibration curve. The SSCV is used to represent the calibration accuracy of the instrument and must perform within method stated guidelines. This sample is used to document calibration accuracy. The SSCV can be the same solution as the LCS, but is analyzed as an instrument standard, rather than a method prepared standard.
Serial Dilution	A subsequent dilution of a high concentration field sample that should agree within 10% of the original undiluted analysis. In metals analysis, a serial dilution is included in each preparation batch if target analyte concentration is at least fifty times the IDL. This is generally used as a test for matrix interferents or matrix effects.
Standard Operating Procedure (SOP)	A written document which details the method of an operation, analysis or action whose techniques and procedures are thoroughly prescribed and which is accepted as the method for performing certain routine or repetitive tasks.
Standard Reference Material	A certified reference material produced by the U.S. National Institute of Standards and Technology (NIST) and characterized for absolute content independent of analytical method.
Standards Addition	The process of spiking a known amount of analyte into an extract/digestate to observe the increase in concentration of the analyte in question. This process can be used to confirm analyte identification or suspected matrix interferences.
Surrogate	A compound that is similar to the target analytes in chemical composition and behavior and not expected to occur naturally in field samples. Surrogates are spiked by preparation/analytical personnel to assess sample preparation and analytical efficiency in each individual field sample.
Tentatively Identified Compound (TIC)	Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates. TICs can be tentatively identified using mass spectrometers in spectral comparisons with NBS library searches. Quantitation of TICs provides a rough approximation of the concentration of these non-target analytes.
Trip Blank	A sample of analyte-free media (usually laboratory DI) that is taken from the laboratory to the sampling site and then returned unopened to the laboratory. The trip blank is used to ensure that cross contamination does not occur during shipment/storage and is used mainly for VOC analyses.

Table 3.3b
Analytical Capabilities
AE=Air Emissions, DW=Drinking Water, NPW=Non-potable Water, SCM=Solid Chemical Materials

The information listed is subject to change.
Always check with the laboratory for the most updated information.

Matrix	Method	Parameter
AE	EPA 0040	Hazardous organics
AE	EPA 0040	Hazardous organics
AE	EPA 3C	Carbon Dioxide
AE	EPA 3C	Methane
AE	EPA 3C	Nitrogen
AE	EPA 3C	Oxygen
AE	EPA 3C	Carbon Dioxide
AE	EPA 3C	Methane
AE	EPA 3C	Nitrogen
AE	EPA 3C	Oxygen
AE	EPA TO-15	Ethanol
AE	EPA TO-15	Gasoline range organic
AE	EPA TO-15	Naphthalene
AE	EPA TO-15	Allyl chloride
AE	EPA TO-15	Chlorotoluene (2-)
AE	EPA TO-15	Isopropylbenzene
AE	EPA TO-15	Methyl methacrylate
AE	EPA TO-15	Trimethylpentane (2,2,4-)
AE	EPA TO-15	Tert-butyl alcohol
AE	EPA TO-15	Tetrahydrofuran
AE	EPA TO-15	Vinyl bromide
AE	EPA TO-15	Dibromoethane (1,2-) (EDB)
AE	EPA TO-15	Dichloroethene (1,1-)
AE	EPA TO-15	Hexachlorobutadiene (1,3-)
AE	EPA TO-15	Hexanone (2-)
AE	EPA TO-15	Acetone
AE	EPA TO-15	Chloromethane
AE	EPA TO-15	Dibromochloromethane
AE	EPA TO-15	Dichlorodifluoromethane
AE	EPA TO-15	Dichloroethene (cis-1,2-)
AE	EPA TO-15	Dichloroethene (trans-1,2-)
AE	EPA TO-15	Dichloropropene (trans-1,3-)

AE	EPA TO-15	Dichlorotetrafluoroethane (1,2-)
AE	EPA TO-15	Ethylbenzene
AE	EPA TO-15	Ethyltoluene (4-)
AE	EPA TO-15	Isopropanol
AE	EPA TO-15	Propylene
AE	EPA TO-15	Trichlorofluoromethane
AE	EPA TO-15	Vinyl chloride
AE	EPA TO-15	Acetaldehyde
AE	EPA TO-15	Acetonitrile
AE	EPA TO-15	Benzene
AE	EPA TO-15	Benzyl chloride
AE	EPA TO-15	Bromodichloromethane
AE	EPA TO-15	Bromoform
AE	EPA TO-15	Bromomethane
AE	EPA TO-15	Butadiene (1,3-)
AE	EPA TO-15	Carbon disulfide
AE	EPA TO-15	Carbon tetrachloride
AE	EPA TO-15	Chlorobenzene
AE	EPA TO-15	Chloroethane
AE	EPA TO-15	Chloroform
AE	EPA TO-15	Cyclohexane
AE	EPA TO-15	Dichlorobenzene (1,2-)
AE	EPA TO-15	Dichlorobenzene (1,3-)
AE	EPA TO-15	Dichlorobenzene (1,4-)
AE	EPA TO-15	Dichloroethane (1,1-)
AE	EPA TO-15	Dichloroethane (1,2-)
AE	EPA TO-15	Dichloropropane (1,2-)
AE	EPA TO-15	Dichloropropene (cis-1,3-)
AE	EPA TO-15	Dioxane (1,4-)
AE	EPA TO-15	Heptane (n-)
AE	EPA TO-15	Hexane (n-)
AE	EPA TO-15	Methyl alcohol (Methanol)
AE	EPA TO-15	Methyl ethyl ketone
AE	EPA TO-15	Methyl iodide
AE	EPA TO-15	Methyl isobutyl ketone (MIBK)
AE	EPA TO-15	Methyl tert-butyl ether
AE	EPA TO-15	Methylene chloride (Dichloromethane)
AE	EPA TO-15	Styrene
AE	EPA TO-15	Trichlorobenzene (1,2,4-)
AE	EPA TO-15	Trimethylbenzene (1,3,5-)
AE	EPA TO-15	Trimethylbenzene (1,2,4-)

AE	EPA TO-15	Tetrachloroethane (1,1,2,2-)
AE	EPA TO-15	Tetrachloroethene
AE	EPA TO-15	Toluene
AE	EPA TO-15	Trichloroethane (1,1,1-)
AE	EPA TO-15	Trichloroethane (1,1,2-)
AE	EPA TO-15	Trichloroethene
AE	EPA TO-15	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
AE	EPA TO-15	Vinyl acetate
AE	EPA TO-15	Xylene (m-)
AE	EPA TO-15	Xylene (o-)
AE	EPA TO-15	Xylene (p-)
AE	EPA TO-15	Xylenes (total)
DW	EPA 150.1	pH
DW	EPA 1622	Cryptosporidium
DW	EPA 1623	Cryptosporidium
DW	EPA 180.1	Turbidity
DW	EPA 200.7	Silica
DW	EPA 200.7	Arsenic
DW	EPA 200.7	Cadmium
DW	EPA 200.7	Chromium
DW	EPA 200.7	Copper
DW	EPA 200.7	Calcium-hardness
DW	EPA 200.7	Total hardness
DW	EPA 200.7	Magnesium
DW	EPA 200.7	Sodium
DW	EPA 200.7	Calcium
DW	EPA 200.7	Aluminum
DW	EPA 200.7	Barium
DW	EPA 200.7	Beryllium
DW	EPA 200.7	Iron
DW	EPA 200.7	Manganese
DW	EPA 200.7	Nickel
DW	EPA 200.7	Silver
DW	EPA 200.7	Zinc
DW	EPA 200.8	Barium
DW	EPA 200.8	Manganese
DW	EPA 200.8	Beryllium
DW	EPA 200.8	Nickel
DW	EPA 200.8	Zinc
DW	EPA 200.8	Silver
DW	EPA 200.8	Antimony

DW	EPA 200.8	Arsenic
DW	EPA 200.8	Cadmium
DW	EPA 200.8	Chromium
DW	EPA 200.8	Copper
DW	EPA 200.8	Lead
DW	EPA 200.8	Selenium
DW	EPA 200.8	Thallium
DW	EPA 218.6	Chromium (VI)
DW	EPA 218.6	Chromium (VI)
DW	EPA 245.1	Mercury
DW	EPA 300.0	Nitrite
DW	EPA 300.0	Chlorate
DW	EPA 300.0	Chlorite (monthly)
DW	EPA 300.0	Nitrate
DW	EPA 300.0	Fluoride
DW	EPA 300.0	Sulfate
DW	EPA 300.0	Bromide
DW	EPA 300.0	Chloride
DW	EPA 300.1	Nitrite
DW	EPA 300.1	Chlorite (monthly)
DW	EPA 300.1	Nitrate
DW	EPA 300.1	Fluoride
DW	EPA 300.1	Chloride
DW	EPA 314.0	Perchlorate
DW	EPA 335.4	Cyanide
DW	EPA 350.1	Ammonia
DW	EPA 353.2	Nitrate
DW	EPA 353.2	Nitrite
DW	EPA 504.1	Trichloropropane (1,2,3-)
DW	EPA 504.1	Dibromoethane (1,2-) (EDB)
DW	EPA 504.1	Dibromo-3-chloropropane (1,2-)
DW	EPA 507	Alachlor
DW	EPA 507	Butachlor
DW	EPA 507	Metolachlor
DW	EPA 507	Metribuzin
DW	EPA 507	Atrazine
DW	EPA 507	Simazine
DW	EPA 508	Chlordane (alpha)
DW	EPA 508	Chlordane (gamma)
DW	EPA 508	Hexachlorocyclopentadiene
DW	EPA 508	Endrin

DW	EPA 508	Heptachlor
DW	EPA 508	Heptachlor epoxide
DW	EPA 508	Hexachlorobenzene
DW	EPA 508	Lindane (gamma BHC)
DW	EPA 508	Methoxychlor
DW	EPA 508	Chlordane (technical)
DW	EPA 508	Toxaphene
DW	EPA 508	Aldrin
DW	EPA 508	Alpha BHC
DW	EPA 508	Beta BHC
DW	EPA 508	Delta BHC
DW	EPA 508	DDD (4,4'-)
DW	EPA 508	DDE (4,4'-)
DW	EPA 508	DDT (4,4'-)
DW	EPA 508	Dieldrin
DW	EPA 508	Endosulfan I
DW	EPA 508	Endosulfan II
DW	EPA 508	Endosulfan sulfate
DW	EPA 508	Endrin aldehyde
DW	EPA 508	Endrin ketone
DW	EPA 515.1	D (2,4-)
DW	EPA 515.1	Dalapon
DW	EPA 515.1	Dinoseb
DW	EPA 515.1	TP (2,4,5-) (Silvex)
DW	EPA 515.1	DB (2,4-)
DW	EPA 515.1	Dicamba
DW	EPA 515.1	Dichlorprop
DW	EPA 515.1	T (2,4,5-)
DW	EPA 524.2	Tetrahydrofuran
DW	EPA 524.2	Dichloro-2-butene (trans-1,4-)
DW	EPA 524.2	Hexachloroethane
DW	EPA 524.2	Acetone
DW	EPA 524.2	Butanone (2-)
DW	EPA 524.2	Carbon disulfide
DW	EPA 524.2	Hexanone (2-)
DW	EPA 524.2	Methyl iodide
DW	EPA 524.2	Pentanone (4-methyl-2-) (MIBK)
DW	EPA 524.2	Trichlorobenzene (1,3,5-)
DW	EPA 524.2	Bromochloromethane
DW	EPA 524.2	Bromoform
DW	EPA 524.2	Chloroform

DW	EPA 524.2	Dibromochloromethane
DW	EPA 524.2	Bromodichloromethane
DW	EPA 524.2	Benzene
DW	EPA 524.2	Carbon tetrachloride
DW	EPA 524.2	Chlorobenzene
DW	EPA 524.2	Dichlorobenzene (1,2-)
DW	EPA 524.2	Dichlorobenzene (1,3-)
DW	EPA 524.2	Dichlorobenzene (1,4-)
DW	EPA 524.2	Dichloroethane (1,1-)
DW	EPA 524.2	Dichloroethane (1,2-)
DW	EPA 524.2	Dichloroethene (cis-1,2-)
DW	EPA 524.2	Dichloroethene (trans-1,2-)
DW	EPA 524.2	Methylene chloride (Dichloromethane)
DW	EPA 524.2	Dichloropropane (1,2-)
DW	EPA 524.2	Ethylbenzene
DW	EPA 524.2	Methyl tert-butyl ether
DW	EPA 524.2	Naphthalene
DW	EPA 524.2	Styrene
DW	EPA 524.2	Tetrachloroethane (1,1,2,2-)
DW	EPA 524.2	Tetrachloroethene
DW	EPA 524.2	Trichloroethane (1,1,1-)
DW	EPA 524.2	Trichloroethene
DW	EPA 524.2	Toluene
DW	EPA 524.2	Trichlorobenzene (1,2,4-)
DW	EPA 524.2	Dichloroethene (1,1-)
DW	EPA 524.2	Trichloroethane (1,1,2-)
DW	EPA 524.2	Vinyl chloride
DW	EPA 524.2	Xylenes (total)
DW	EPA 524.2	Bromobenzene
DW	EPA 524.2	Bromomethane
DW	EPA 524.2	Butyl benzene (n-)
DW	EPA 524.2	Sec-butylbenzene
DW	EPA 524.2	Tert-butylbenzene
DW	EPA 524.2	Chloroethane
DW	EPA 524.2	Chloromethane
DW	EPA 524.2	Chlorotoluene (2-)
DW	EPA 524.2	Chlorotoluene (4-)
DW	EPA 524.2	Dibromo-3-chloropropane (1,2-)
DW	EPA 524.2	Dibromoethane (1,2-) (EDB)
DW	EPA 524.2	Dibromomethane
DW	EPA 524.2	Dichlorodifluoromethane

DW	EPA 524.2	Dichloropropane (1,3-)
DW	EPA 524.2	Dichloropropane (2,2-)
DW	EPA 524.2	Dichloropropene (1,1-)
DW	EPA 524.2	Dichloropropene (cis-1,3-)
DW	EPA 524.2	Dichloropropene (trans-1,3-)
DW	EPA 524.2	Hexachlorobutadiene (1,3-)
DW	EPA 524.2	Isopropylbenzene
DW	EPA 524.2	Isopropyltoluene (4-)
DW	EPA 524.2	Propylbenzene (n-)
DW	EPA 524.2	Tetrachloroethane (1,1,1,2-)
DW	EPA 524.2	Trichlorobenzene (1,2,3-)
DW	EPA 524.2	Trichlorofluoromethane
DW	EPA 524.2	Trichloropropane (1,2,3-)
DW	EPA 524.2	Trimethylbenzene (1,2,4-)
DW	EPA 524.2	Trimethylbenzene (1,3,5-)
DW	EPA 552.2	Bromochloroacetic acid
DW	EPA 552.2	Dibromoacetic acid
DW	EPA 552.2	Dichloroacetic acid
DW	EPA 552.2	Monobromoacetic acid (MBAA)
DW	EPA 552.2	Monochloroacetic acid (MCAA)
DW	EPA 552.2	Trichloroacetic acid
DW	Other Hach Company	Total coliform / E. coli
DW	Other Kelada-01	Cyanide
DW	SM 2120 B	Color
DW	SM 2130 B	Turbidity
DW	SM 2150 B	Odor
DW	SM 2320 B	Alkalinity
DW	SM 2340 B	Total hardness
DW	SM 2340 C	Total hardness
DW	SM 2510 B	Conductivity
DW	SM 2540 C	Total dissolved solids (TDS)
DW	SM 3120 B-11	Total hardness
DW	SM 3500-Ca B (20th ed)	Calcium-hardness
DW	SM 3500-Ca D (18/19th ed)	Calcium-hardness
DW	SM 4110 B	Bromide
DW	SM 4110 B	Nitrite
DW	SM 4110 B	Nitrate
DW	SM 4110 B	Fluoride
DW	SM 4110 B	Sulfate
DW	SM 4110 B	Chloride
DW	SM 4500-Cl G	Chlorine - residual

DW	SM 4500-CN C, E	Cyanide
DW	SM 4500-CN C, G	Cyanide
DW	SM 4500-H B	pH
DW	SM 4500-NH3 G	Ammonia
DW	SM 4500-NO3 F	Nitrate
DW	SM 4500-NO3 F	Nitrite
DW	SM 4500-P E	Orthophosphate
DW	SM 5310 B	Total organic carbon (TOC)
DW	SM 5310 C	Dissolved organic carbon (DOC)
DW	SM 5310 C	Total organic carbon (TOC)
DW	SM 5320 B	Total organic halides (TOX)
DW	SM 5540 C	Foaming agents
DW	SM 5910 B	UV-absorbing compounds
DW	SM 9223 B	Total coliform / E. coli
DW	User Defined 524.2	Diisopropyl Ether [DIPE]
NPW		Perchlorate
NPW	ASTM D1067	Acidity as CaCO3
NPW	ASTM D6503	Enterococci
NPW	ASTM F1647-02A	Total organic carbon (TOC)
NPW	EPA 1000.0	Toxicity - chronic, FW organism
NPW	EPA 1002.0	Toxicity - chronic, FW organism
NPW	EPA 120.1	Specific conductance
NPW	EPA 130.1	Hardness - total as CaCO3
NPW	EPA 160.4	Residue - volatile
NPW	EPA 1657	Phorate
NPW	EPA 1657	Bolstar
NPW	EPA 1657	Chlorpyrifos
NPW	EPA 1657	Coumaphos
NPW	EPA 1657	Dichlorvos
NPW	EPA 1657	Dimethoate
NPW	EPA 1657	EPN
NPW	EPA 1657	Fensulfothion
NPW	EPA 1657	Fenthion
NPW	EPA 1657	Naled
NPW	EPA 1657	Parathion ethyl
NPW	EPA 1657	Parathion methyl
NPW	EPA 1657	Ronnel
NPW	EPA 1657	Stirofos
NPW	EPA 1657	Sulfotepp
NPW	EPA 1657	TEPP
NPW	EPA 1657	Tokuthion [Prototthiofos]

NPW	EPA 1657	Trichloronate
NPW	EPA 1658	D (2,4-)
NPW	EPA 1658	Dalapon
NPW	EPA 1658	Dichlorprop
NPW	EPA 1664A and B	Oil & grease - hem-SPE
NPW	EPA 1664A and B	Oil & grease - non polar
NPW	EPA 1664A and B	Oil & grease - hem-LL
NPW	EPA 1664A and B	Oil & grease - sgt-non polar
NPW	EPA 180.1	Turbidity
NPW	EPA 200.7	Silica - dissolved
NPW	EPA 200.7	Titanium
NPW	EPA 200.7	Hardness - total as CaCO3
NPW	EPA 200.7	Cobalt
NPW	EPA 200.7	Aluminum
NPW	EPA 200.7	Antimony
NPW	EPA 200.7	Arsenic
NPW	EPA 200.7	Barium
NPW	EPA 200.7	Beryllium
NPW	EPA 200.7	Cadmium
NPW	EPA 200.7	Chromium
NPW	EPA 200.7	Copper
NPW	EPA 200.7	Iron
NPW	EPA 200.7	Lead
NPW	EPA 200.7	Manganese
NPW	EPA 200.7	Molybdenum
NPW	EPA 200.7	Nickel
NPW	EPA 200.7	Selenium
NPW	EPA 200.7	Silver
NPW	EPA 200.7	Thallium
NPW	EPA 200.7	Tin
NPW	EPA 200.7	Vanadium
NPW	EPA 200.7	Zinc
NPW	EPA 200.7	Boron
NPW	EPA 200.7	Calcium
NPW	EPA 200.7	Magnesium
NPW	EPA 200.7	Potassium
NPW	EPA 200.7	Sodium
NPW	EPA 200.8	Antimony
NPW	EPA 200.8	Arsenic
NPW	EPA 200.8	Barium
NPW	EPA 200.8	Beryllium

NPW	EPA 200.8	Cadmium
NPW	EPA 200.8	Chromium
NPW	EPA 200.8	Copper
NPW	EPA 200.8	Lead
NPW	EPA 200.8	Manganese
NPW	EPA 200.8	Molybdenum
NPW	EPA 200.8	Nickel
NPW	EPA 200.8	Selenium
NPW	EPA 200.8	Silver
NPW	EPA 200.8	Thallium
NPW	EPA 200.8	Tin
NPW	EPA 200.8	Vanadium
NPW	EPA 200.8	Zinc
NPW	EPA 2000.0	Toxicity - acute, FW organism
NPW	EPA 2002.0	Toxicity - acute, FW organism
NPW	EPA 218.6	Chromium (VI)
NPW	EPA 245.1	Mercury
NPW	EPA 300.0	Guanidine nitrate
NPW	EPA 300.0	Bromide
NPW	EPA 300.0	Chloride
NPW	EPA 300.0	Fluoride
NPW	EPA 300.0	Nitrate
NPW	EPA 300.0	Nitrite
NPW	EPA 300.0	Sulfate
NPW	EPA 300.0	Nitrate - nitrite
NPW	EPA 300.1	Nitrate - nitrite
NPW	EPA 300.1	Bromide
NPW	EPA 300.1	Chloride
NPW	EPA 300.1	Fluoride
NPW	EPA 300.1	Nitrate
NPW	EPA 300.1	Nitrite
NPW	EPA 300.1	Sulfate
NPW	EPA 310.2	Alkalinity as CaCO3
NPW	EPA 335.4	Cyanide
NPW	EPA 350.1	Ammonia
NPW	EPA 351.1, .2 - 350.1	Organic nitrogen
NPW	EPA 351.2	Kjeldahl nitrogen - total
NPW	EPA 353.2	Nitrate - nitrite
NPW	EPA 410.4	Chemical oxygen demand
NPW	EPA 420.4	Phenols
NPW	EPA 507	Alachlor

NPW	EPA 507	Metribuzin
NPW	EPA 507	Ethoprop
NPW	EPA 507	Merphos
NPW	EPA 507	Mevinphos
NPW	EPA 515.1	DB (2,4-)
NPW	EPA 515.1	Dinoseb
NPW	EPA 555	MCPA
NPW	EPA 555	MCPP
NPW	EPA 602	Benzene
NPW	EPA 602	Ethylbenzene
NPW	EPA 602	Methyl tert-butyl ether
NPW	EPA 602	Tert-butyl alcohol
NPW	EPA 602	Toluene
NPW	EPA 602	Xylenes (total)
NPW	EPA 608	Chloroneb
NPW	EPA 608	Chlorothalonil
NPW	EPA 608	Chlordane (alpha)
NPW	EPA 608	Chlordane (gamma)
NPW	EPA 608	Hexachlorobenzene
NPW	EPA 608	PCB 1016
NPW	EPA 608	PCB 1221
NPW	EPA 608	PCB 1232
NPW	EPA 608	PCB 1242
NPW	EPA 608	PCB 1248
NPW	EPA 608	PCB 1254
NPW	EPA 608	PCB 1260
NPW	EPA 608	Aldrin
NPW	EPA 608	Alpha BHC
NPW	EPA 608	Beta BHC
NPW	EPA 608	Delta BHC
NPW	EPA 608	Lindane (gamma BHC)
NPW	EPA 608	Chlordane
NPW	EPA 608	DDD (4,4'-)
NPW	EPA 608	DDE (4,4'-)
NPW	EPA 608	DDT (4,4'-)
NPW	EPA 608	Dieldrin
NPW	EPA 608	Endosulfan I
NPW	EPA 608	Endosulfan II
NPW	EPA 608	Endosulfan sulfate
NPW	EPA 608	Endrin
NPW	EPA 608	Endrin aldehyde

NPW	EPA 608	Endrin ketone
NPW	EPA 608	Heptachlor
NPW	EPA 608	Heptachlor epoxide
NPW	EPA 608	Methoxychlor
NPW	EPA 608	Toxaphene
NPW	EPA 610	Acenaphthene
NPW	EPA 610	Acenaphthylene
NPW	EPA 610	Anthracene
NPW	EPA 610	Benzo(a)anthracene
NPW	EPA 610	Benzo(a)pyrene
NPW	EPA 610	Benzo(b)fluoranthene
NPW	EPA 610	Benzo(ghi)perylene
NPW	EPA 610	Benzo(k)fluoranthene
NPW	EPA 610	Chrysene
NPW	EPA 610	Dibenzo(a,h)anthracene
NPW	EPA 610	Fluoranthene
NPW	EPA 610	Fluorene
NPW	EPA 610	Indeno(1,2,3-cd)pyrene
NPW	EPA 610	Naphthalene
NPW	EPA 610	Phenanthrene
NPW	EPA 610	Pyrene
NPW	EPA 615	Dicamba
NPW	EPA 622	Coumaphos
NPW	EPA 622	Demeton (o-)
NPW	EPA 622	Demeton (s-)
NPW	EPA 622	Dimethoate
NPW	EPA 622	Parathion ethyl
NPW	EPA 622	Parathion methyl
NPW	EPA 622	Stirofos
NPW	EPA 622	Sulfotepp
NPW	EPA 622	TEPP
NPW	EPA 622	Tokuthion [Protothiofos]
NPW	EPA 622	Trichloronate
NPW	EPA 624	Amyl alcohol (n-)
NPW	EPA 624	Propionitrile
NPW	EPA 624	Trimethylbenzene (1,2,3-)
NPW	EPA 624	Allyl chloride
NPW	EPA 624	Bromoethane
NPW	EPA 624	Butanone (2-)
NPW	EPA 624	Butadiene (2-chloro-1,3-)
NPW	EPA 624	Carbon disulfide

NPW	EPA 624	Cyclohexanone
NPW	EPA 624	Dichloro-2-butene (cis-1,4-)
NPW	EPA 624	Dichloro-2-butene (trans-1,4-)
NPW	EPA 624	Diethyl ether (Ethyl ether)
NPW	EPA 624	Isopropanol
NPW	EPA 624	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
NPW	EPA 624	Vinyl acetate
NPW	EPA 624	Acetonitrile
NPW	EPA 624	Cyclohexane
NPW	EPA 624	Hexanone (2-)
NPW	EPA 624	Methyl acetate
NPW	EPA 624	Methylcyclohexane
NPW	EPA 624	Methyl iodide
NPW	EPA 624	Ethyl-tert-butyl Ether [ETBE]
NPW	EPA 624	Diisopropyl Ether [DIPE]
NPW	EPA 624	Dioxane (1,4-)
NPW	EPA 624	Butanol (1-)
NPW	EPA 624	Ethanol
NPW	EPA 624	Ethyl methacrylate
NPW	EPA 624	Iso-butyl alcohol
NPW	EPA 624	Methacrylonitrile
NPW	EPA 624	Methyl methacrylate
NPW	EPA 624	Octane (-n)
NPW	EPA 624	Nitropropane (2-)
NPW	EPA 624	Pentachloroethane
NPW	EPA 624	tert-Amylmethyl ether [TAME]
NPW	EPA 624	Acrolein
NPW	EPA 624	Acrylonitrile
NPW	EPA 624	Bromobenzene
NPW	EPA 624	Bromochloromethane
NPW	EPA 624	Butyl benzene (n-)
NPW	EPA 624	Chlorotoluene (2-)
NPW	EPA 624	Chlorotoluene (4-)
NPW	EPA 624	Dibromo-3-chloropropane (1,2-)
NPW	EPA 624	Dibromoethane (1,2-) (EDB)
NPW	EPA 624	Dibromomethane
NPW	EPA 624	Dichlorodifluoromethane
NPW	EPA 624	Dichloroethene (cis-1,2-)
NPW	EPA 624	Dichloropropane (1,3-)
NPW	EPA 624	Dichloropropane (2,2-)
NPW	EPA 624	Dichloropropene (1,1-)

NPW	EPA 624	Hexane (n-)
NPW	EPA 624	Methyl isobutyl ketone (MIBK)
NPW	EPA 624	Tetrahydrofuran
NPW	EPA 624	Styrene
NPW	EPA 624	Tetrachloroethane (1,1,1,2-)
NPW	EPA 624	Xylene (m-)
NPW	EPA 624	Xylene (o-)
NPW	EPA 624	Xylene (p-)
NPW	EPA 624	Hexachlorobutadiene (1,3-)
NPW	EPA 624	Isopropylbenzene
NPW	EPA 624	Isopropyltoluene (4-)
NPW	EPA 624	Naphthalene
NPW	EPA 624	Propylbenzene (n-)
NPW	EPA 624	Sec-butylbenzene
NPW	EPA 624	Tert-butylbenzene
NPW	EPA 624	Trichlorobenzene (1,2,3-)
NPW	EPA 624	Trichlorobenzene (1,2,4-)
NPW	EPA 624	Trichloropropane (1,2,3-)
NPW	EPA 624	Trimethylbenzene (1,2,4-)
NPW	EPA 624	Trimethylbenzene (1,3,5-)
NPW	EPA 624	Acetone
NPW	EPA 624	Ethyl acetate
NPW	EPA 624	Methyl tert-butyl ether
NPW	EPA 624	Tert-butyl alcohol
NPW	EPA 624	Xylenes (total)
NPW	EPA 624	Benzene
NPW	EPA 624	Bromodichloromethane
NPW	EPA 624	Bromoform
NPW	EPA 624	Bromomethane
NPW	EPA 624	Carbon tetrachloride
NPW	EPA 624	Chlorobenzene
NPW	EPA 624	Chloroethane
NPW	EPA 624	Chloroethyl vinyl ether (2-)
NPW	EPA 624	Chloroform
NPW	EPA 624	Chloromethane
NPW	EPA 624	Dibromochloromethane
NPW	EPA 624	Dichlorobenzene (1,2-)
NPW	EPA 624	Dichlorobenzene (1,3-)
NPW	EPA 624	Dichlorobenzene (1,4-)
NPW	EPA 624	Dichloroethane (1,1-)
NPW	EPA 624	Dichloroethane (1,2-)

NPW	EPA 624	Dichloroethene (1,1-)
NPW	EPA 624	Dichloroethene (trans-1,2-)
NPW	EPA 624	Dichloropropane (1,2-)
NPW	EPA 624	Dichloropropene (cis-1,3-)
NPW	EPA 624	Dichloropropene (trans-1,3-)
NPW	EPA 624	Ethylbenzene
NPW	EPA 624	Methylene chloride (Dichloromethane)
NPW	EPA 624	Tetrachloroethane (1,1,2,2-)
NPW	EPA 624	Tetrachloroethene
NPW	EPA 624	Toluene
NPW	EPA 624	Trichloroethane (1,1,1-)
NPW	EPA 624	Trichloroethane (1,1,2-)
NPW	EPA 624	Trichloroethene
NPW	EPA 624	Trichlorofluoromethane
NPW	EPA 624	Vinyl chloride
NPW	EPA 625	Tetrachlorophenol (2,3,4,6-)
NPW	EPA 625	Hexachlorophene
NPW	EPA 625	Decane (n-)
NPW	EPA 625	Octadecane (n-)
NPW	EPA 625	Biphenylamine (4-)
NPW	EPA 625	Chloronaphthalene (1-)
NPW	EPA 625	Famphur
NPW	EPA 625	Hexachloropropene
NPW	EPA 625	Kepone
NPW	EPA 625	Napththylamine (1-)
NPW	EPA 625	Napththylamine (2-)
NPW	EPA 625	Pentachloroethane
NPW	EPA 625	Napthoquinone (1,4-)
NPW	EPA 625	Methylnaphthalene (2-)
NPW	EPA 625	Chloroaniline (4-)
NPW	EPA 625	Nitroaniline (2-)
NPW	EPA 625	Nitroaniline (3-)
NPW	EPA 625	Nitroaniline (4-)
NPW	EPA 625	Pentachlorobenzene
NPW	EPA 625	Tetrachlorobenzene (1,2,4,5-)
NPW	EPA 625	Methylphenol (4-)
NPW	EPA 625	Acetophenone
NPW	EPA 625	Alpha - terpineol
NPW	EPA 625	Aniline
NPW	EPA 625	Dichloroaniline (2,3-)
NPW	EPA 625	Diphenylhydrazine (1,2-)

NPW	EPA 625	Methylphenol (2-)
NPW	EPA 625	N-Nitroso-di-n-butylamine
NPW	EPA 625	N-Nitrosodiethylamine
NPW	EPA 625	N-Nitrosopyrrolidine
NPW	EPA 625	Hexachlorocyclopentadiene
NPW	EPA 625	N-Nitrosodimethylamine
NPW	EPA 625	N-Nitrosodiphenylamine
NPW	EPA 625	Dibenzofuran
NPW	EPA 625	Methylphenol (2-)
NPW	EPA 625	Methylphenol (4-)
NPW	EPA 625	Trichlorophenol (2,4,5-)
NPW	EPA 625	Benzoic acid
NPW	EPA 625	Benzidine
NPW	EPA 625	Carbazole
NPW	EPA 625	Pyridine
NPW	EPA 625	Acenaphthene
NPW	EPA 625	Acenaphthylene
NPW	EPA 625	Anthracene
NPW	EPA 625	Benzo(a)anthracene
NPW	EPA 625	Benzo(b)fluoranthene
NPW	EPA 625	Benzo(k)fluoranthene
NPW	EPA 625	Benzo(a)pyrene
NPW	EPA 625	Benzo(ghi)perylene
NPW	EPA 625	Butyl benzyl phthalate
NPW	EPA 625	Bis (2-chloroethyl) ether
NPW	EPA 625	Bis (2-chloroethoxy) methane
NPW	EPA 625	Bis (2-ethylhexyl) phthalate
NPW	EPA 625	Bis (2-chloroisopropyl) ether
NPW	EPA 625	Bromophenyl-phenyl ether (4-)
NPW	EPA 625	Chloronaphthalene (2-)
NPW	EPA 625	Chlorophenyl-phenyl ether (4-)
NPW	EPA 625	Chrysene
NPW	EPA 625	Dibenzo(a,h)anthracene
NPW	EPA 625	Di-n-butyl phthalate
NPW	EPA 625	Dichlorobenzidine (3,3'-)
NPW	EPA 625	Diethyl phthalate
NPW	EPA 625	Dimethyl phthalate
NPW	EPA 625	Dinitrotoluene (2,4-)
NPW	EPA 625	Dinitrotoluene (2,6-)
NPW	EPA 625	Di-n-octyl phthalate
NPW	EPA 625	Fluoranthene

NPW	EPA 625	Fluorene
NPW	EPA 625	Hexachlorobenzene
NPW	EPA 625	Hexachlorobutadiene (1,3-)
NPW	EPA 625	Hexachloroethane
NPW	EPA 625	Indeno(1,2,3-cd)pyrene
NPW	EPA 625	Isophorone
NPW	EPA 625	Naphthalene
NPW	EPA 625	Nitrobenzene
NPW	EPA 625	N-Nitroso-di-n-propylamine
NPW	EPA 625	Phenanthrene
NPW	EPA 625	Pyrene
NPW	EPA 625	Trichlorobenzene (1,2,4-)
NPW	EPA 625	Methyl phenol (4-chloro-3-)
NPW	EPA 625	Chlorophenol (2-)
NPW	EPA 625	Dichlorophenol (2,4-)
NPW	EPA 625	Dimethylphenol (2,4-)
NPW	EPA 625	Dinitrophenol (2,4-)
NPW	EPA 625	Dinitrophenol (2-methyl-4,6-)
NPW	EPA 625	Nitrophenol (2-)
NPW	EPA 625	Nitrophenol (4-)
NPW	EPA 625	Pentachlorophenol
NPW	EPA 625	Phenol
NPW	EPA 625	Trichlorophenol (2,4,6-)
NPW	Other FL - PRO	Petroleum Organics
NPW	Other IA - OA-1	Petroleum Organics
NPW	Other IA - OA-2	Petroleum Organics
NPW	Other J. Chrom. Sci. RSK-175	Propane
NPW	Other J. Chrom. Sci. RSK-175	Ethane
NPW	Other J. Chrom. Sci. RSK-175	Ethene
NPW	Other J. Chrom. Sci. RSK-175	Methane
NPW	Other Kelada-01	Cyanide
NPW	Other Kelada-01	Cyanide - amenable to Cl2
NPW	Other NJ-OQA-QAM-025	Petroleum Organics
NPW	Other NJ-OQA-QAM-025, Rev. 7	Petroleum Organics
NPW	Other NJ-OQA-QAM-025, Rev. 7	Petroleum Organics
NPW	Other USDA-LOI (Loss on ignition)	Total organic carbon (TOC)
NPW	Other Walkley Black	Total organic carbon (TOC)
NPW	SM 2120 B-11	Color
NPW	SM 2130 B-01	Turbidity
NPW	SM 2310 B-11	Acidity as CaCO3
NPW	SM 2320 B-11	Alkalinity as CaCO3

NPW	SM 2340 B-11	Hardness - total as CaCO3
NPW	SM 2340 C-11	Hardness - total as CaCO3
NPW	SM 2510 B-11	Specific conductance
NPW	SM 2540 B-11	Residue - total
NPW	SM 2540 C-11	Residue - filterable (TDS)
NPW	SM 2540 D-11	Residue - nonfilterable (TSS)
NPW	SM 2540 F-11	Residue - settleable
NPW	SM 2540 G SM 18th Ed.	Total, fixed, and volatile solids (SQAR)
NPW	SM 2550 B-00	Temperature
NPW	SM 3500-Cr B-11	Chromium (VI)
NPW	SM 3500-Cr C-11	Chromium (VI)
NPW	SM 3500-Cr D (18/19th ed)	Chromium (VI)
NPW	SM 3500-Cr E (18/19th ed)	Chromium (VI)
NPW	SM 3500-Fe B-11	Iron, Ferrous
NPW	SM 4110 B or C-11	Nitrate - nitrite
NPW	SM 4110 B or C-11	Chloride
NPW	SM 4110 B or C-11	Fluoride
NPW	SM 4110 B or C-11	Nitrate
NPW	SM 4110 B or C-11	Nitrite
NPW	SM 4110 B or C-11	Sulfate
NPW	SM 4500-Cl G-11	Chlorine
NPW	SM 4500-Cl G-11	Chlorine
NPW	SM 4500-CN B or C-11 plus E-11	Cyanide
NPW	SM 4500-CN B or C-11 and G-11	Cyanide - amenable to Cl2
NPW	SM 4500-H B-11	pH
NPW	SM 4500-N Org B or C-11 plus NH3 B-11 plus NH3 C-11	Kjeldahl nitrogen - total
NPW	SM 4500-NH3 B plus G-11	Ammonia
NPW	SM 4500-NH3 B, C, D, E, F, G, H-11	Organic nitrogen
NPW	SM 4500-NO3 F-11	Nitrate - nitrite
NPW	SM 4500-O C-11	Oxygen (dissolved)
NPW	SM 4500-O G-11	Oxygen (dissolved)
NPW	SM 4500-P B5-11 plus E-11	Phosphorus (total)
NPW	SM 4500-P E-11	Orthophosphate
NPW	SM 4500-S B, C plus D-11	Sulfides
NPW	SM 4500-SO3 B-11	Sulfite - SO3
NPW	SM 5210 B-11	Carbonaceous BOD (CBOD)
NPW	SM 5210 B-11	Biochemical oxygen demand
NPW	SM 5220 D-11	Chemical oxygen demand
NPW	SM 5310 B, C or D	Dissolved organic carbon (DOC)
NPW	SM 5310 B-11	Total organic carbon (TOC)

NPW	SM 5320 B	Total organic halides (TOX)
NPW	SM 5520 B	Oil & grease - total recov
NPW	SM 5520 B-11	Oil & grease - hem-LL
NPW	SM 5540 C-11	Surfactants
NPW	SM 6200 B-11	Propionitrile
NPW	SM 6200 B-11	Trimethylbenzene (1,2,3-)
NPW	SM 6200 B-11	Allyl chloride
NPW	SM 6200 B-11	Bromoethane
NPW	SM 6200 B-11	Butadiene (2-chloro-1,3-)
NPW	SM 6200 B-11	Cyclohexanone
NPW	SM 6200 B-11	Dichloro-2-butene (cis-1,4-)
NPW	SM 6200 B-11	Dichloro-2-butene (trans-1,4-)
NPW	SM 6200 B-11	Diethyl ether (Ethyl ether)
NPW	SM 6200 B-11	Isopropanol
NPW	SM 6200 B-11	Ethyl-tert-butyl Ether [ETBE]
NPW	SM 6200 B-11	Diisopropyl Ether [DIPE]
NPW	SM 6200 B-11	Dioxane (1,4-)
NPW	SM 6200 B-11	Ethanol
NPW	SM 6200 B-11	Ethyl methacrylate
NPW	SM 6200 B-11	Iso-butyl alcohol
NPW	SM 6200 B-11	Methacrylonitrile
NPW	SM 6200 B-11	Methyl methacrylate
NPW	SM 6200 B-11	Pentachloroethane
NPW	SM 6200 B-11	tert-Amylmethyl ether [TAME]
NPW	SM 6200 B-11	Acrolein
NPW	SM 6200 B-11	Acrylonitrile
NPW	SM 6200 B-11	Bromobenzene
NPW	SM 6200 B-11	Bromochloromethane
NPW	SM 6200 B-11	Butyl benzene (n-)
NPW	SM 6200 B-11	Chlorotoluene (2-)
NPW	SM 6200 B-11	Chlorotoluene (4-)
NPW	SM 6200 B-11	Dibromo-3-chloropropane (1,2-)
NPW	SM 6200 B-11	Dibromomethane
NPW	SM 6200 B-11	Dichlorodifluoromethane
NPW	SM 6200 B-11	Dichloropropane (1,3-)
NPW	SM 6200 B-11	Dichloropropane (2,2-)
NPW	SM 6200 B-11	Dichloropropene (1,1-)
NPW	SM 6200 B-11	Hexane (n-)
NPW	SM 6200 B-11	Methyl isobutyl ketone (MIBK)
NPW	SM 6200 B-11	Tetrahydrofuran
NPW	SM 6200 B-11	Tetrachloroethane (1,1,1,2-)

NPW	SM 6200 B-11	Xylene (m-)
NPW	SM 6200 B-11	Xylene (p-)
NPW	SM 6200 B-11	Hexachlorobutadiene (1,3-)
NPW	SM 6200 B-11	Isopropylbenzene
NPW	SM 6200 B-11	Isopropyltoluene (4-)
NPW	SM 6200 B-11	Propylbenzene (n-)
NPW	SM 6200 B-11	Sec-butylbenzene
NPW	SM 6200 B-11	Tert-butylbenzene
NPW	SM 6200 B-11	Trichlorobenzene (1,2,3-)
NPW	SM 6200 B-11	Trichloropropane (1,2,3-)
NPW	SM 6200 B-11	Trimethylbenzene (1,2,4-)
NPW	SM 6200 B-11	Trimethylbenzene (1,3,5-)
NPW	SM 6200 B-11	Acetone
NPW	SM 6200 B-11	Ethyl acetate
NPW	SM 6200 B-11	Methyl tert-butyl ether
NPW	SM 6200 B-11	Tert-butyl alcohol
NPW	SM 6200 B-11	Benzene
NPW	SM 6200 B-11	Bromodichloromethane
NPW	SM 6200 B-11	Bromoform
NPW	SM 6200 B-11	Bromomethane
NPW	SM 6200 B-11	Carbon tetrachloride
NPW	SM 6200 B-11	Chlorobenzene
NPW	SM 6200 B-11	Chloroethane
NPW	SM 6200 B-11	Chloroform
NPW	SM 6200 B-11	Chloromethane
NPW	SM 6200 B-11	Dibromochloromethane
NPW	SM 6200 B-11	Dichlorobenzene (1,2-)
NPW	SM 6200 B-11	Dichlorobenzene (1,3-)
NPW	SM 6200 B-11	Dichlorobenzene (1,4-)
NPW	SM 6200 B-11	Dichloroethane (1,1-)
NPW	SM 6200 B-11	Dichloroethane (1,2-)
NPW	SM 6200 B-11	Dichloroethene (1,1-)
NPW	SM 6200 B-11	Dichloroethene (trans-1,2-)
NPW	SM 6200 B-11	Dichloropropane (1,2-)
NPW	SM 6200 B-11	Dichloropropene (cis-1,3-)
NPW	SM 6200 B-11	Dichloropropene (trans-1,3-)
NPW	SM 6200 B-11	Ethylbenzene
NPW	SM 6200 B-11	Methylene chloride (Dichloromethane)
NPW	SM 6200 B-11	Tetrachloroethane (1,1,2,2-)
NPW	SM 6200 B-11	Tetrachloroethene
NPW	SM 6200 B-11	Toluene

NPW	SM 6200 B-11	Trichloroethane (1,1,1-)
NPW	SM 6200 B-11	Trichloroethane (1,1,2-)
NPW	SM 6200 B-11	Trichloroethene
NPW	SM 6200 B-11	Trichlorofluoromethane
NPW	SM 6200 B-11	Vinyl chloride
NPW	SM 6200 B-97	Naphthalene
NPW	SM 6200 B-97	Trichlorobenzene (1,2,4-)
NPW	SM 6410 B-00	Tetrachlorophenol (2,3,4,6-)
NPW	SM 6410 B-00	Hexachlorophene
NPW	SM 6410 B-00	Decane (n-)
NPW	SM 6410 B-00	Octadecane (n-)
NPW	SM 6410 B-00	Biphenylamine (4-)
NPW	SM 6410 B-00	Chloronaphthalene (1-)
NPW	SM 6410 B-00	Famphur
NPW	SM 6410 B-00	Hexachloropropene
NPW	SM 6410 B-00	Kepone
NPW	SM 6410 B-00	Napththylamine (1-)
NPW	SM 6410 B-00	Napththylamine (2-)
NPW	SM 6410 B-00	Pentachloroethane
NPW	SM 6410 B-00	Napthoquinone (1,4-)
NPW	SM 6410 B-00	Methylphenol (4-)
NPW	SM 6410 B-00	Acetophenone
NPW	SM 6410 B-00	Alpha - terpineol
NPW	SM 6410 B-00	Aniline
NPW	SM 6410 B-00	Dichloroaniline (2,3-)
NPW	SM 6410 B-00	Methylphenol (2-)
NPW	SM 6410 B-00	Hexachlorocyclopentadiene
NPW	SM 6410 B-00	N-Nitrosodimethylamine
NPW	SM 6410 B-00	N-Nitrosodiphenylamine
NPW	SM 6410 B-00	Benzoic acid
NPW	SM 6410 B-00	Benzidine
NPW	SM 6410 B-00	Carbazole
NPW	SM 6410 B-00	Pyridine
NPW	SM 6410 B-00	Acenaphthene
NPW	SM 6410 B-00	Acenaphthylene
NPW	SM 6410 B-00	Anthracene
NPW	SM 6410 B-00	Benzo(a)anthracene
NPW	SM 6410 B-00	Benzo(b)fluoranthene
NPW	SM 6410 B-00	Benzo(k)fluoranthene
NPW	SM 6410 B-00	Benzo(a)pyrene
NPW	SM 6410 B-00	Benzo(ghi)perylene

NPW	SM 6410 B-00	Butyl benzyl phthalate
NPW	SM 6410 B-00	Bis (2-chloroethyl) ether
NPW	SM 6410 B-00	Bis (2-chloroethoxy) methane
NPW	SM 6410 B-00	Bis (2-ethylhexyl) phthalate
NPW	SM 6410 B-00	Bis (2-chloroisopropyl) ether
NPW	SM 6410 B-00	Bromophenyl-phenyl ether (4-)
NPW	SM 6410 B-00	Chloronaphthalene (2-)
NPW	SM 6410 B-00	Chlorophenyl-phenyl ether (4-)
NPW	SM 6410 B-00	Chrysene
NPW	SM 6410 B-00	Dibenzo(a,h)anthracene
NPW	SM 6410 B-00	Di-n-butyl phthalate
NPW	SM 6410 B-00	Dichlorobenzidine (3,3'-)
NPW	SM 6410 B-00	Diethyl phthalate
NPW	SM 6410 B-00	Dimethyl phthalate
NPW	SM 6410 B-00	Dinitrotoluene (2,4-)
NPW	SM 6410 B-00	Dinitrotoluene (2,6-)
NPW	SM 6410 B-00	Di-n-octyl phthalate
NPW	SM 6410 B-00	Fluoranthene
NPW	SM 6410 B-00	Fluorene
NPW	SM 6410 B-00	Hexachlorobenzene
NPW	SM 6410 B-00	Hexachlorobutadiene (1,3-)
NPW	SM 6410 B-00	Hexachloroethane
NPW	SM 6410 B-00	Indeno(1,2,3-cd)pyrene
NPW	SM 6410 B-00	Isophorone
NPW	SM 6410 B-00	Naphthalene
NPW	SM 6410 B-00	Nitrobenzene
NPW	SM 6410 B-00	N-Nitroso-di-n-propylamine
NPW	SM 6410 B-00	Phenanthrene
NPW	SM 6410 B-00	Pyrene
NPW	SM 6410 B-00	Trichlorobenzene (1,2,4-)
NPW	SM 6410 B-00	Methyl phenol (4-chloro-3-)
NPW	SM 6410 B-00	Chlorophenol (2-)
NPW	SM 6410 B-00	Dichlorophenol (2,4-)
NPW	SM 6410 B-00	Dimethylphenol (2,4-)
NPW	SM 6410 B-00	Dinitrophenol (2,4-)
NPW	SM 6410 B-00	Dinitrophenol (2-methyl-4,6-)
NPW	SM 6410 B-00	Nitrophenol (2-)
NPW	SM 6410 B-00	Nitrophenol (4-)
NPW	SM 6410 B-00	Pentachlorophenol
NPW	SM 6410 B-00	Phenol
NPW	SM 6410 B-00	Trichlorophenol (2,4,6-)

NPW	SM 6440 B-00	Acenaphthene
NPW	SM 6440 B-00	Acenaphthylene
NPW	SM 6440 B-00	Anthracene
NPW	SM 6440 B-00	Benzo(a)anthracene
NPW	SM 6440 B-00	Benzo(a)pyrene
NPW	SM 6440 B-00	Benzo(b)fluoranthene
NPW	SM 6440 B-00	Benzo(ghi)perylene
NPW	SM 6440 B-00	Benzo(k)fluoranthene
NPW	SM 6440 B-00	Chrysene
NPW	SM 6440 B-00	Dibenzo(a,h)anthracene
NPW	SM 6440 B-00	Fluoranthene
NPW	SM 6440 B-00	Fluorene
NPW	SM 6440 B-00	Indeno(1,2,3-cd)pyrene
NPW	SM 6440 B-00	Naphthalene
NPW	SM 6440 B-00	Phenanthrene
NPW	SM 6440 B-00	Pyrene
NPW	SM 6630 B-00	Trifluralin
NPW	SM 6630 B-00	Aldrin
NPW	SM 6630 B-00	Alpha BHC
NPW	SM 6630 B-00	Lindane (gamma BHC)
NPW	SM 6630 B-00	Chlordane
NPW	SM 6630 B-00	DDD (4,4'-)
NPW	SM 6630 B-00	DDE (4,4'-)
NPW	SM 6630 B-00	DDT (4,4'-)
NPW	SM 6630 B-00	Dieldrin
NPW	SM 6630 B-00	Endosulfan I
NPW	SM 6630 B-00	Endosulfan II
NPW	SM 6630 B-00	Endrin
NPW	SM 6630 B-00	Heptachlor
NPW	SM 6630 B-00	Heptachlor epoxide
NPW	SM 6630 B-00	Methoxychlor
NPW	SM 6630 B-00	Toxaphene
NPW	SM 6630C-00	Etridiazole
NPW	SM 6630C-00	Aldrin
NPW	SM 6630C-00	Alpha BHC
NPW	SM 6630C-00	Beta BHC
NPW	SM 6630C-00	Delta BHC
NPW	SM 6630C-00	Lindane (gamma BHC)
NPW	SM 6630C-00	Chlordane
NPW	SM 6630C-00	DDD (4,4'-)
NPW	SM 6630C-00	DDE (4,4'-)

NPW	SM 6630C-00	DDT (4,4'-)
NPW	SM 6630C-00	Dieldrin
NPW	SM 6630C-00	Endosulfan I
NPW	SM 6630C-00	Endosulfan II
NPW	SM 6630C-00	Endosulfan sulfate
NPW	SM 6630C-00	Endrin
NPW	SM 6630C-00	Heptachlor
NPW	SM 6630C-00	Heptachlor epoxide
NPW	SM 6630C-00	Methoxychlor
NPW	SM 6630C-00	Toxaphene
NPW	SM 6640 B-01	D (2,4-)
NPW	SM 6640 B-01	Dalapon
NPW	SM 6640 B-01	T (2,4,5-)
NPW	SM 6640 B-01	TP (2,4,5-) (Silvex)
NPW	SM 9215 B	Heterotrophic plate count
NPW	SM 9222 B-97	Total coliform
NPW	SM 9222 D-97	Fecal coliform
NPW	SM 9222D-97 (Class B only) plus EPA 625/R-92/013 App. F	Fecal coliform
NPW	SM 9260 D plus EPA 625/R-92/013 Appendix F	Salmonella sp. Bacteria
NPW	SW-846 1010	Ignitability
NPW	SW-846 1010A	Ignitability
NPW	SW-846 1110	Corrosivity toward steel
NPW	SW-846 1110A	Corrosivity toward steel
NPW	SW-846 1310A	Metals - organics
NPW	SW-846 1310B	Metals - organics
NPW	SW-846 1311	Volatile organics
NPW	SW-846 1311	Semivolatile organics
NPW	SW-846 1311	Metals
NPW	SW-846 1312	Metals - organics
NPW	SW-846 1320	Metals - organics
NPW	SW-846 3005A	Metals, Total Rec and Dissolved
NPW	SW-846 3010A	Metals, Total
NPW	SW-846 3015	Metals
NPW	SW-846 3015A	Metals
NPW	SW-846 3020A	Metals
NPW	SW-846 3510C	Semivolatile organics
NPW	SW-846 3511	Semivolatile organics
NPW	SW-846 3520C	Semivolatile organics
NPW	SW-846 5030B	Volatile organics

NPW	SW-846 6010B	Lithium
NPW	SW-846 6010B	Strontium
NPW	SW-846 6010B	Titanium
NPW	SW-846 6010B	Silver
NPW	SW-846 6010B	Tin
NPW	SW-846 6010B	Aluminum
NPW	SW-846 6010B	Antimony
NPW	SW-846 6010B	Arsenic
NPW	SW-846 6010B	Barium
NPW	SW-846 6010B	Beryllium
NPW	SW-846 6010B	Boron
NPW	SW-846 6010B	Cadmium
NPW	SW-846 6010B	Calcium
NPW	SW-846 6010B	Chromium
NPW	SW-846 6010B	Cobalt
NPW	SW-846 6010B	Copper
NPW	SW-846 6010B	Iron
NPW	SW-846 6010B	Lead
NPW	SW-846 6010B	Magnesium
NPW	SW-846 6010B	Manganese
NPW	SW-846 6010B	Molybdenum
NPW	SW-846 6010B	Nickel
NPW	SW-846 6010B	Potassium
NPW	SW-846 6010B	Selenium
NPW	SW-846 6010B	Sodium
NPW	SW-846 6010B	Thallium
NPW	SW-846 6010B	Vanadium
NPW	SW-846 6010B	Zinc
NPW	SW-846 6010C	Lithium
NPW	SW-846 6010C	Strontium
NPW	SW-846 6010C	Titanium
NPW	SW-846 6010C	Silver
NPW	SW-846 6010C	Tin
NPW	SW-846 6010C	Aluminum
NPW	SW-846 6010C	Antimony
NPW	SW-846 6010C	Arsenic
NPW	SW-846 6010C	Barium
NPW	SW-846 6010C	Beryllium
NPW	SW-846 6010C	Boron
NPW	SW-846 6010C	Cadmium
NPW	SW-846 6010C	Calcium

NPW	SW-846 6010C	Chromium
NPW	SW-846 6010C	Cobalt
NPW	SW-846 6010C	Copper
NPW	SW-846 6010C	Iron
NPW	SW-846 6010C	Lead
NPW	SW-846 6010C	Magnesium
NPW	SW-846 6010C	Manganese
NPW	SW-846 6010C	Molybdenum
NPW	SW-846 6010C	Nickel
NPW	SW-846 6010C	Potassium
NPW	SW-846 6010C	Selenium
NPW	SW-846 6010C	Sodium
NPW	SW-846 6010C	Thallium
NPW	SW-846 6010C	Vanadium
NPW	SW-846 6010C	Zinc
NPW	SW-846 6020	Tin
NPW	SW-846 6020	Barium
NPW	SW-846 6020	Manganese
NPW	SW-846 6020	Molybdenum
NPW	SW-846 6020	Vanadium
NPW	SW-846 6020	Zinc
NPW	SW-846 6020	Beryllium
NPW	SW-846 6020	Nickel
NPW	SW-846 6020	Selenium
NPW	SW-846 6020	Antimony
NPW	SW-846 6020	Arsenic
NPW	SW-846 6020	Cadmium
NPW	SW-846 6020	Chromium
NPW	SW-846 6020	Copper
NPW	SW-846 6020	Lead
NPW	SW-846 6020	Silver
NPW	SW-846 6020	Thallium
NPW	SW-846 6020A	Tin
NPW	SW-846 6020A	Barium
NPW	SW-846 6020A	Manganese
NPW	SW-846 6020A	Molybdenum
NPW	SW-846 6020A	Vanadium
NPW	SW-846 6020A	Zinc
NPW	SW-846 6020A	Beryllium
NPW	SW-846 6020A	Nickel
NPW	SW-846 6020A	Selenium

NPW	SW-846 6020A	Antimony
NPW	SW-846 6020A	Arsenic
NPW	SW-846 6020A	Cadmium
NPW	SW-846 6020A	Chromium
NPW	SW-846 6020A	Copper
NPW	SW-846 6020A	Lead
NPW	SW-846 6020A	Silver
NPW	SW-846 6020A	Thallium
NPW	SW-846 7196A	Chromium (VI)
NPW	SW-846 7199	Chromium (VI)
NPW	SW-846 7470A	Mercury - liquid waste
NPW	SW-846 8011	Dibromoethane (1,2-) (EDB)
NPW	SW-846 8011	Dibromo-3-chloropropane (1,2-)
NPW	SW-846 8015B	Ethylene glycol
NPW	SW-846 8015B	Propylene glycol
NPW	SW-846 8015B	Methyl alcohol (Methanol)
NPW	SW-846 8015B	Ethyl alcohol
NPW	SW-846 8015B	Gasoline range organic
NPW	SW-846 8015B	Diesel range organic
NPW	SW-846 8015C	Ethylene glycol
NPW	SW-846 8015C	Propylene glycol
NPW	SW-846 8015D	Ethylene glycol
NPW	SW-846 8015D	Propylene glycol
NPW	SW-846 8015D	Methyl alcohol (Methanol)
NPW	SW-846 8015D	Ethyl alcohol
NPW	SW-846 8015D	Gasoline range organic
NPW	SW-846 8015D	Diesel range organic
NPW	SW-846 8021B	Xylenes (total)
NPW	SW-846 8021B	Methyl tert-butyl ether
NPW	SW-846 8021B	Benzene
NPW	SW-846 8021B	Ethylbenzene
NPW	SW-846 8021B	Toluene
NPW	SW-846 8021B	Xylene (o-)
NPW	SW-846 8021B	Xylene (m-)
NPW	SW-846 8021B	Xylene (p-)
NPW	SW-846 8081A	Alachlor
NPW	SW-846 8081A	Chlordane (alpha)
NPW	SW-846 8081A	Chlordane (gamma)
NPW	SW-846 8081A	Chloroneb
NPW	SW-846 8081A	Chlorothalonil
NPW	SW-846 8081A	Etridiazole

NPW	SW-846 8081A	Hexachlorobenzene
NPW	SW-846 8081A	Hexachlorocyclopentadiene
NPW	SW-846 8081A	Permethrin
NPW	SW-846 8081A	Propachlor
NPW	SW-846 8081A	Trifluralin
NPW	SW-846 8081A	Aldrin
NPW	SW-846 8081A	Alpha BHC
NPW	SW-846 8081A	Beta BHC
NPW	SW-846 8081A	Delta BHC
NPW	SW-846 8081A	Lindane (gamma BHC)
NPW	SW-846 8081A	Chlordane (technical)
NPW	SW-846 8081A	DDD (4,4'-)
NPW	SW-846 8081A	DDE (4,4'-)
NPW	SW-846 8081A	DDT (4,4'-)
NPW	SW-846 8081A	Dieldrin
NPW	SW-846 8081A	Endosulfan I
NPW	SW-846 8081A	Endosulfan II
NPW	SW-846 8081A	Endosulfan sulfate
NPW	SW-846 8081A	Endrin
NPW	SW-846 8081A	Endrin aldehyde
NPW	SW-846 8081A	Endrin ketone
NPW	SW-846 8081A	Heptachlor
NPW	SW-846 8081A	Heptachlor epoxide
NPW	SW-846 8081A	Methoxychlor
NPW	SW-846 8081A	Toxaphene
NPW	SW-846 8081B	Alachlor
NPW	SW-846 8081B	Chlordane (alpha)
NPW	SW-846 8081B	Chlordane (gamma)
NPW	SW-846 8081B	Chloroneb
NPW	SW-846 8081B	Chlorothalonil
NPW	SW-846 8081B	Etridiazole
NPW	SW-846 8081B	Hexachlorobenzene
NPW	SW-846 8081B	Hexachlorocyclopentadiene
NPW	SW-846 8081B	Permethrin
NPW	SW-846 8081B	Propachlor
NPW	SW-846 8081B	Trifluralin
NPW	SW-846 8081B	Aldrin
NPW	SW-846 8081B	Alpha BHC
NPW	SW-846 8081B	Beta BHC
NPW	SW-846 8081B	Delta BHC
NPW	SW-846 8081B	Lindane (gamma BHC)

NPW	SW-846 8081B	Chlordane (technical)
NPW	SW-846 8081B	DDD (4,4'-)
NPW	SW-846 8081B	DDE (4,4'-)
NPW	SW-846 8081B	DDT (4,4'-)
NPW	SW-846 8081B	Dieldrin
NPW	SW-846 8081B	Endosulfan I
NPW	SW-846 8081B	Endosulfan II
NPW	SW-846 8081B	Endosulfan sulfate
NPW	SW-846 8081B	Endrin
NPW	SW-846 8081B	Endrin aldehyde
NPW	SW-846 8081B	Endrin ketone
NPW	SW-846 8081B	Heptachlor
NPW	SW-846 8081B	Heptachlor epoxide
NPW	SW-846 8081B	Methoxychlor
NPW	SW-846 8081B	Toxaphene
NPW	SW-846 8082	PCB 1016
NPW	SW-846 8082	PCB 1221
NPW	SW-846 8082	PCB 1232
NPW	SW-846 8082	PCB 1242
NPW	SW-846 8082	PCB 1248
NPW	SW-846 8082	PCB 1254
NPW	SW-846 8082	PCB 1260
NPW	SW-846 8082A	PCB 1016
NPW	SW-846 8082A	PCB 1221
NPW	SW-846 8082A	PCB 1232
NPW	SW-846 8082A	PCB 1242
NPW	SW-846 8082A	PCB 1248
NPW	SW-846 8082A	PCB 1254
NPW	SW-846 8082A	PCB 1260
NPW	SW-846 8141A	Azinphos methyl
NPW	SW-846 8141A	Chlorpyrifos
NPW	SW-846 8141A	Demeton (o-)
NPW	SW-846 8141A	Demeton (s-)
NPW	SW-846 8141A	Disulfoton
NPW	SW-846 8141A	Bolstar
NPW	SW-846 8141A	Coumaphos
NPW	SW-846 8141A	Dichlorvos
NPW	SW-846 8141A	Dimethoate
NPW	SW-846 8141A	EPN
NPW	SW-846 8141A	Ethoprop
NPW	SW-846 8141A	Fensulfothion

NPW	SW-846 8141A	Fenthion
NPW	SW-846 8141A	Merphos
NPW	SW-846 8141A	Mevinphos
NPW	SW-846 8141A	Naled
NPW	SW-846 8141A	Parathion
NPW	SW-846 8141A	Parathion methyl
NPW	SW-846 8141A	Phorate
NPW	SW-846 8141A	Ronnel
NPW	SW-846 8141A	Stirofos
NPW	SW-846 8141A	Sulfotepp
NPW	SW-846 8141A	TEPP
NPW	SW-846 8141A	Tokuthion [Protothiofos]
NPW	SW-846 8141A	Trichloronate
NPW	SW-846 8141A	Diazinon
NPW	SW-846 8141A	Malathion
NPW	SW-846 8141B	Azinphos methyl
NPW	SW-846 8141B	Chlorpyrifos
NPW	SW-846 8141B	Demeton (o-)
NPW	SW-846 8141B	Demeton (s-)
NPW	SW-846 8141B	Disulfoton
NPW	SW-846 8141B	Bolstar
NPW	SW-846 8141B	Coumaphos
NPW	SW-846 8141B	Dichlorvos
NPW	SW-846 8141B	Dimethoate
NPW	SW-846 8141B	EPN
NPW	SW-846 8141B	Ethoprop
NPW	SW-846 8141B	Fensulfothion
NPW	SW-846 8141B	Fenthion
NPW	SW-846 8141B	Merphos
NPW	SW-846 8141B	Mevinphos
NPW	SW-846 8141B	Naled
NPW	SW-846 8141B	Parathion
NPW	SW-846 8141B	Parathion methyl
NPW	SW-846 8141B	Phorate
NPW	SW-846 8141B	Ronnel
NPW	SW-846 8141B	Stirofos
NPW	SW-846 8141B	Sulfotepp
NPW	SW-846 8141B	TEPP
NPW	SW-846 8141B	Tokuthion [Protothiofos]
NPW	SW-846 8141B	Trichloronate
NPW	SW-846 8141B	Diazinon

NPW	SW-846 8141B	Malathion
NPW	SW-846 8151A	Dicamba
NPW	SW-846 8151A	DB (2,4-)
NPW	SW-846 8151A	Dinoseb
NPW	SW-846 8151A	Dalapon
NPW	SW-846 8151A	Dichlorprop
NPW	SW-846 8151A	D (2,4-)
NPW	SW-846 8151A	T (2,4,5-)
NPW	SW-846 8151A	TP (2,4,5-) (Silvex)
NPW	SW-846 8151A	MCPA
NPW	SW-846 8151A	MCPP
NPW	SW-846 8260B	Hexane (n-)
NPW	SW-846 8260B	Trimethylpentane (2,2,4-)
NPW	SW-846 8260B	Methylnaphthalene (1-)
NPW	SW-846 8260B	Methylnaphthalene (2-)
NPW	SW-846 8260B	Butanol (3,3-Dimethyl-1-)
NPW	SW-846 8260B	Trimethylpentane (2,2,4-)
NPW	SW-846 8260B	Trimethylbenzene (1,2,3-)
NPW	SW-846 8260B	Cyclohexane
NPW	SW-846 8260B	Butanol (1-)
NPW	SW-846 8260B	Nitropropane (2-)
NPW	SW-846 8260B	Butyl formate (t-)
NPW	SW-846 8260B	Methyl acetate
NPW	SW-846 8260B	Pentanol (2-Methyl-2-)
NPW	SW-846 8260B	Amyl alcohol (t-)
NPW	SW-846 8260B	Methylcyclohexane
NPW	SW-846 8260B	Octane (-n)
NPW	SW-846 8260B	tert-Amylmethyl ether [TAME]
NPW	SW-846 8260B	Bromoethane
NPW	SW-846 8260B	Cyclohexanone
NPW	SW-846 8260B	Diisopropyl Ether [DIPE]
NPW	SW-846 8260B	Tetrahydrofuran
NPW	SW-846 8260B	Ethyl-tert-butyl Ether [ETBE]
NPW	SW-846 8260B	Safrole
NPW	SW-846 8260B	Xylene (m-)
NPW	SW-846 8260B	Xylene (o-)
NPW	SW-846 8260B	Xylene (p-)
NPW	SW-846 8260B	Dichloro-2-butene (cis-1,4-)
NPW	SW-846 8260B	Diethyl ether (Ethyl ether)
NPW	SW-846 8260B	Dichloro-2-butene (trans-1,4-)
NPW	SW-846 8260B	Ethanol

NPW	SW-846 8260B	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
NPW	SW-846 8260B	Vinyl acetate
NPW	SW-846 8260B	Pentachloroethane
NPW	SW-846 8260B	Tert-butyl alcohol
NPW	SW-846 8260B	Dioxane (1,4-)
NPW	SW-846 8260B	Bromobenzene
NPW	SW-846 8260B	Butyl benzene (n-)
NPW	SW-846 8260B	Sec-butylbenzene
NPW	SW-846 8260B	Tert-butylbenzene
NPW	SW-846 8260B	Chlorotoluene (2-)
NPW	SW-846 8260B	Chlorotoluene (4-)
NPW	SW-846 8260B	Isopropylbenzene
NPW	SW-846 8260B	Propylbenzene (n-)
NPW	SW-846 8260B	Isopropyltoluene (4-)
NPW	SW-846 8260B	Trichlorobenzene (1,2,3-)
NPW	SW-846 8260B	Trimethylbenzene (1,2,4-)
NPW	SW-846 8260B	Trimethylbenzene (1,3,5-)
NPW	SW-846 8260B	Allyl chloride
NPW	SW-846 8260B	Bromochloromethane
NPW	SW-846 8260B	Butadiene (2-chloro-1,3-)
NPW	SW-846 8260B	Dibromoethane (1,2-) (EDB)
NPW	SW-846 8260B	Dibromomethane
NPW	SW-846 8260B	Dibromo-3-chloropropane (1,2-)
NPW	SW-846 8260B	Dichloropropane (1,3-)
NPW	SW-846 8260B	Dichloropropane (2,2-)
NPW	SW-846 8260B	Dichloropropene (1,1-)
NPW	SW-846 8260B	Trichloropropane (1,2,3-)
NPW	SW-846 8260B	Ethyl acetate
NPW	SW-846 8260B	Ethyl methacrylate
NPW	SW-846 8260B	Methacrylonitrile
NPW	SW-846 8260B	Methyl acrylate
NPW	SW-846 8260B	Methyl methacrylate
NPW	SW-846 8260B	Methyl iodide
NPW	SW-846 8260B	Iso-butyl alcohol
NPW	SW-846 8260B	Isopropanol
NPW	SW-846 8260B	N-Nitroso-di-n-butylamine
NPW	SW-846 8260B	Propionitrile
NPW	SW-846 8260B	Acetonitrile
NPW	SW-846 8260B	Benzene
NPW	SW-846 8260B	Chlorobenzene
NPW	SW-846 8260B	Dichlorobenzene (1,2-)

NPW	SW-846 8260B	Dichlorobenzene (1,3-)
NPW	SW-846 8260B	Dichlorobenzene (1,4-)
NPW	SW-846 8260B	Ethylbenzene
NPW	SW-846 8260B	Toluene
NPW	SW-846 8260B	Xylenes (total)
NPW	SW-846 8260B	Bromodichloromethane
NPW	SW-846 8260B	Bromoform
NPW	SW-846 8260B	Bromomethane
NPW	SW-846 8260B	Carbon tetrachloride
NPW	SW-846 8260B	Chloroethane
NPW	SW-846 8260B	Chloroethyl vinyl ether (2-)
NPW	SW-846 8260B	Chloroform
NPW	SW-846 8260B	Chloromethane
NPW	SW-846 8260B	Dichloropropene (trans-1,3-)
NPW	SW-846 8260B	Dibromochloromethane
NPW	SW-846 8260B	Dichlorodifluoromethane
NPW	SW-846 8260B	Dichloroethane (1,1-)
NPW	SW-846 8260B	Dichloroethane (1,2-)
NPW	SW-846 8260B	Dichloroethene (1,1-)
NPW	SW-846 8260B	Dichloroethene (trans-1,2-)
NPW	SW-846 8260B	Dichloroethene (cis-1,2-)
NPW	SW-846 8260B	Dichloropropane (1,2-)
NPW	SW-846 8260B	Dichloropropene (cis-1,3-)
NPW	SW-846 8260B	Methylene chloride (Dichloromethane)
NPW	SW-846 8260B	Tetrachloroethane (1,1,2,2-)
NPW	SW-846 8260B	Tetrachloroethene
NPW	SW-846 8260B	Trichloroethane (1,1,1-)
NPW	SW-846 8260B	Trichloroethane (1,1,2-)
NPW	SW-846 8260B	Trichloroethene
NPW	SW-846 8260B	Trichlorofluoromethane
NPW	SW-846 8260B	Vinyl chloride
NPW	SW-846 8260B	Acetone
NPW	SW-846 8260B	Carbon disulfide
NPW	SW-846 8260B	Butanone (2-)
NPW	SW-846 8260B	Hexanone (2-)
NPW	SW-846 8260B	Pentanone (4-methyl-2-) (MIBK)
NPW	SW-846 8260B	Methyl tert-butyl ether
NPW	SW-846 8260B	Acrolein
NPW	SW-846 8260B	Acrylonitrile
NPW	SW-846 8260B	Hexachlorobutadiene (1,3-)
NPW	SW-846 8260B	Hexachloroethane

NPW	SW-846 8260B	Naphthalene
NPW	SW-846 8260B	Styrene
NPW	SW-846 8260B	Tetrachloroethane (1,1,1,2-)
NPW	SW-846 8260B	Trichlorobenzene (1,2,4-)
NPW	SW-846 8260C	Trimethylpentane (2,2,4-)
NPW	SW-846 8260C	Methylnaphthalene (1-)
NPW	SW-846 8260C	Methylnaphthalene (2-)
NPW	SW-846 8260C	Butanol (3,3-Dimethyl-1-)
NPW	SW-846 8260C	Trimethylbenzene (1,2,3-)
NPW	SW-846 8260C	Cyclohexane
NPW	SW-846 8260C	Butanol (1-)
NPW	SW-846 8260C	Nitropropane (2-)
NPW	SW-846 8260C	Butyl formate (t-)
NPW	SW-846 8260C	Methyl acetate
NPW	SW-846 8260C	Pentanol (2-Methyl-2-)
NPW	SW-846 8260C	Amyl alcohol (t-)
NPW	SW-846 8260C	Methylcyclohexane
NPW	SW-846 8260C	Octane (-n)
NPW	SW-846 8260C	tert-Amylmethyl ether [TAME]
NPW	SW-846 8260C	Bromoethane
NPW	SW-846 8260C	Cyclohexanone
NPW	SW-846 8260C	Diisopropyl Ether [DIPE]
NPW	SW-846 8260C	Tetrahydrofuran
NPW	SW-846 8260C	Ethyl-tert-butyl Ether [ETBE]
NPW	SW-846 8260C	Xylene (m-)
NPW	SW-846 8260C	Xylene (o-)
NPW	SW-846 8260C	Xylene (p-)
NPW	SW-846 8260C	Dichloro-2-butene (cis-1,4-)
NPW	SW-846 8260C	Diethyl ether (Ethyl ether)
NPW	SW-846 8260C	Dichloro-2-butene (trans-1,4-)
NPW	SW-846 8260C	Ethanol
NPW	SW-846 8260C	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
NPW	SW-846 8260C	Vinyl acetate
NPW	SW-846 8260C	Pentachloroethane
NPW	SW-846 8260C	Tert-butyl alcohol
NPW	SW-846 8260C	Dioxane (1,4-)
NPW	SW-846 8260C	Bromobenzene
NPW	SW-846 8260C	Butyl benzene (n-)
NPW	SW-846 8260C	Sec-butylbenzene
NPW	SW-846 8260C	Tert-butylbenzene
NPW	SW-846 8260C	Chlorotoluene (2-)

NPW	SW-846 8260C	Chlorotoluene (4-)
NPW	SW-846 8260C	Isopropylbenzene
NPW	SW-846 8260C	Propylbenzene (n-)
NPW	SW-846 8260C	Isopropyltoluene (4-)
NPW	SW-846 8260C	Trichlorobenzene (1,2,3-)
NPW	SW-846 8260C	Trimethylbenzene (1,2,4-)
NPW	SW-846 8260C	Trimethylbenzene (1,3,5-)
NPW	SW-846 8260C	Allyl chloride
NPW	SW-846 8260C	Bromochloromethane
NPW	SW-846 8260C	Butadiene (2-chloro-1,3-)
NPW	SW-846 8260C	Dibromoethane (1,2-) (EDB)
NPW	SW-846 8260C	Dibromomethane
NPW	SW-846 8260C	Dibromo-3-chloropropane (1,2-)
NPW	SW-846 8260C	Dichloropropane (1,3-)
NPW	SW-846 8260C	Dichloropropane (2,2-)
NPW	SW-846 8260C	Dichloropropene (1,1-)
NPW	SW-846 8260C	Trichloropropane (1,2,3-)
NPW	SW-846 8260C	Ethyl acetate
NPW	SW-846 8260C	Ethyl methacrylate
NPW	SW-846 8260C	Methacrylonitrile
NPW	SW-846 8260C	Methyl acrylate
NPW	SW-846 8260C	Methyl methacrylate
NPW	SW-846 8260C	Methyl iodide
NPW	SW-846 8260C	Iso-butyl alcohol
NPW	SW-846 8260C	Isopropanol
NPW	SW-846 8260C	N-Nitroso-di-n-butylamine
NPW	SW-846 8260C	Propionitrile
NPW	SW-846 8260C	Acetonitrile
NPW	SW-846 8260C	Benzene
NPW	SW-846 8260C	Chlorobenzene
NPW	SW-846 8260C	Dichlorobenzene (1,2-)
NPW	SW-846 8260C	Dichlorobenzene (1,3-)
NPW	SW-846 8260C	Dichlorobenzene (1,4-)
NPW	SW-846 8260C	Ethylbenzene
NPW	SW-846 8260C	Toluene
NPW	SW-846 8260C	Xylenes (total)
NPW	SW-846 8260C	Bromodichloromethane
NPW	SW-846 8260C	Bromoform
NPW	SW-846 8260C	Bromomethane
NPW	SW-846 8260C	Carbon tetrachloride
NPW	SW-846 8260C	Chloroethane

NPW	SW-846 8260C	Chloroethyl vinyl ether (2-)
NPW	SW-846 8260C	Chloroform
NPW	SW-846 8260C	Chloromethane
NPW	SW-846 8260C	Dichloropropene (trans-1,3-)
NPW	SW-846 8260C	Dibromochloromethane
NPW	SW-846 8260C	Dichlorodifluoromethane
NPW	SW-846 8260C	Dichloroethane (1,1-)
NPW	SW-846 8260C	Dichloroethane (1,2-)
NPW	SW-846 8260C	Dichloroethene (1,1-)
NPW	SW-846 8260C	Dichloroethene (trans-1,2-)
NPW	SW-846 8260C	Dichloroethene (cis-1,2-)
NPW	SW-846 8260C	Dichloropropane (1,2-)
NPW	SW-846 8260C	Dichloropropene (cis-1,3-)
NPW	SW-846 8260C	Methylene chloride (Dichloromethane)
NPW	SW-846 8260C	Tetrachloroethane (1,1,2,2-)
NPW	SW-846 8260C	Tetrachloroethene
NPW	SW-846 8260C	Trichloroethane (1,1,1-)
NPW	SW-846 8260C	Trichloroethane (1,1,2-)
NPW	SW-846 8260C	Trichloroethene
NPW	SW-846 8260C	Trichlorofluoromethane
NPW	SW-846 8260C	Vinyl chloride
NPW	SW-846 8260C	Acetone
NPW	SW-846 8260C	Carbon disulfide
NPW	SW-846 8260C	Butanone (2-)
NPW	SW-846 8260C	Hexanone (2-)
NPW	SW-846 8260C	Pentanone (4-methyl-2-) (MIBK)
NPW	SW-846 8260C	Methyl tert-butyl ether
NPW	SW-846 8260C	Acrolein
NPW	SW-846 8260C	Acrylonitrile
NPW	SW-846 8260C	Hexachlorobutadiene (1,3-)
NPW	SW-846 8260C	Hexachloroethane
NPW	SW-846 8260C	Naphthalene
NPW	SW-846 8260C	Styrene
NPW	SW-846 8260C	Tetrachloroethane (1,1,1,2-)
NPW	SW-846 8260C	Trichlorobenzene (1,2,4-)
NPW	SW-846 8270C	Biphenyl (1,1'-)
NPW	SW-846 8270C	Benzaldehyde
NPW	SW-846 8270C	Caprolactam
NPW	SW-846 8270C	Atrazine
NPW	SW-846 8270C	Phenanthrene
NPW	SW-846 8270C	Pyrene

NPW	SW-846 8270C	Acenaphthene
NPW	SW-846 8270C	Acenaphthylene
NPW	SW-846 8270C	Anthracene
NPW	SW-846 8270C	Benzo(ghi)perylene
NPW	SW-846 8270C	Chrysene
NPW	SW-846 8270C	Methylnaphthalene (1-)
NPW	SW-846 8270C	Methylnaphthalene (2-)
NPW	SW-846 8270C	Naphthalene
NPW	SW-846 8270C	Fluoranthene
NPW	SW-846 8270C	Fluorene
NPW	SW-846 8270C	Methylnaphthalene (1-)
NPW	SW-846 8270C	Nitrodiphenylamine (2-)
NPW	SW-846 8270C	Nitrodiphenylamine (2-)
NPW	SW-846 8270C	Hexachlorophene
NPW	SW-846 8270C	Diphenylhydrazine (1,2-)
NPW	SW-846 8270C	Decane (n-)
NPW	SW-846 8270C	Octadecane (n-)
NPW	SW-846 8270C	Benzo(a)anthracene
NPW	SW-846 8270C	Benzo(a)pyrene
NPW	SW-846 8270C	Benzo(b)fluoranthene
NPW	SW-846 8270C	Benzo(k)fluoranthene
NPW	SW-846 8270C	Dibenzo(a,h)anthracene
NPW	SW-846 8270C	Indeno(1,2,3-cd)pyrene
NPW	SW-846 8270C	Benzal chloride
NPW	SW-846 8270C	Benzo(j)fluoranthene
NPW	SW-846 8270C	Benzotrichloride
NPW	SW-846 8270C	Benzyl chloride
NPW	SW-846 8270C	Chlorobenzilate
NPW	SW-846 8270C	Dibenz(a,h)acridine
NPW	SW-846 8270C	Dibenzo(a,h)pyrene
NPW	SW-846 8270C	Dibenzo(a,i)pyrene
NPW	SW-846 8270C	Dibenzo(c,g)carbazole (7H-)
NPW	SW-846 8270C	Pentachloroethane
NPW	SW-846 8270C	Tetrachlorobenzene (1,2,3,4-)
NPW	SW-846 8270C	Tetrachlorobenzene (1,2,3,5-)
NPW	SW-846 8270C	Benzyl alcohol
NPW	SW-846 8270C	Acetophenone
NPW	SW-846 8270C	Acetylaminofluorene (2-)
NPW	SW-846 8270C	Aminobiphenyl (4-)
NPW	SW-846 8270C	Aramite
NPW	SW-846 8270C	Chloronaphthalene (1-)

NPW	SW-846 8270C	Diallate (cis)
NPW	SW-846 8270C	Diallate (trans)
NPW	SW-846 8270C	Dibenzo(a,e)pyrene
NPW	SW-846 8270C	Dibenz(a,j)acridine
NPW	SW-846 8270C	Dichlorophenol (2,6-)
NPW	SW-846 8270C	Dimethoate
NPW	SW-846 8270C	Dimethylaminoazobenzene
NPW	SW-846 8270C	Dimethylbenz(a)anthracene (7,12-)
NPW	SW-846 8270C	Dimethyl benzidine (3,3-)
NPW	SW-846 8270C	Dinitrobenzene (1,3-)
NPW	SW-846 8270C	Dinoseb
NPW	SW-846 8270C	Disulfoton
NPW	SW-846 8270C	Famphur
NPW	SW-846 8270C	Hexachloropropene
NPW	SW-846 8270C	Isodrin
NPW	SW-846 8270C	Isosafrole (cis-)
NPW	SW-846 8270C	Isosafrole (trans-)
NPW	SW-846 8270C	Kepone
NPW	SW-846 8270C	Methanesulfonate (Ethyl-)
NPW	SW-846 8270C	Methanesulfonate (Methyl-)
NPW	SW-846 8270C	Methapyrilene
NPW	SW-846 8270C	Methylcholanthrene (3-)
NPW	SW-846 8270C	Napthoquinone (1,4-)
NPW	SW-846 8270C	Napththylamine (1-)
NPW	SW-846 8270C	Napththylamine (2-)
NPW	SW-846 8270C	N-Nitroso-di-n-butylamine
NPW	SW-846 8270C	N-Nitrosomorpholine
NPW	SW-846 8270C	N-Nitrosopiperidine
NPW	SW-846 8270C	Parathion
NPW	SW-846 8270C	Parathion methyl
NPW	SW-846 8270C	Pentachlorobenzene
NPW	SW-846 8270C	Pentachloronitrobenzene
NPW	SW-846 8270C	Phenacetin
NPW	SW-846 8270C	Phenylenediamine (1,4-)
NPW	SW-846 8270C	Phenylethylamine (alpha, alpha-Dimethyl)
NPW	SW-846 8270C	Phorate
NPW	SW-846 8270C	Phosphorothioate (O,O,O-triethyl)
NPW	SW-846 8270C	Phosphorothioate (O,O-diethyl-O-2-pyrazinyl) [Thionazin]
NPW	SW-846 8270C	Picoline (2-)
NPW	SW-846 8270C	Pronamide

NPW	SW-846 8270C	Quinoline -1-Oxide (4-Nitro)
NPW	SW-846 8270C	Safrole
NPW	SW-846 8270C	Sulfotepp
NPW	SW-846 8270C	Tetrachlorobenzene (1,2,4,5-)
NPW	SW-846 8270C	Tetrachlorophenol (2,3,4,6-)
NPW	SW-846 8270C	Toluidine (2-) (2-Methylaniline)
NPW	SW-846 8270C	Toluidine (5-nitro-2-)
NPW	SW-846 8270C	Trinitrobenzene (1,3,5-)
NPW	SW-846 8270C	N-Nitrosodiethylamine
NPW	SW-846 8270C	N-Nitrosopyrrolidine
NPW	SW-846 8270C	Diphenylamine
NPW	SW-846 8270C	Carbazole
NPW	SW-846 8270C	Dichlorobenzene (1,2-)
NPW	SW-846 8270C	Dichlorobenzene (1,3-)
NPW	SW-846 8270C	N-Nitrosodimethylamine
NPW	SW-846 8270C	N-Nitroso-di-n-propylamine
NPW	SW-846 8270C	N-Nitrosomethylethylamine
NPW	SW-846 8270C	Benzidine
NPW	SW-846 8270C	Aniline
NPW	SW-846 8270C	Hexachloropropene
NPW	SW-846 8270C	Dibenzofuran
NPW	SW-846 8270C	Benzoic acid
NPW	SW-846 8270C	N-Nitrosodiphenylamine
NPW	SW-846 8270C	Dichlorobenzidine (3,3'-)
NPW	SW-846 8270C	Chloroaniline (4-)
NPW	SW-846 8270C	Nitroaniline (2-)
NPW	SW-846 8270C	Nitroaniline (3-)
NPW	SW-846 8270C	Nitroaniline (4-)
NPW	SW-846 8270C	Chloronaphthalene (2-)
NPW	SW-846 8270C	Hexachlorobenzene
NPW	SW-846 8270C	Hexachlorobutadiene (1,3-)
NPW	SW-846 8270C	Hexachlorocyclopentadiene
NPW	SW-846 8270C	Hexachloroethane
NPW	SW-846 8270C	Trichlorobenzene (1,2,4-)
NPW	SW-846 8270C	Bis (2-chloroethoxy) methane
NPW	SW-846 8270C	Bis (2-chloroethyl) ether
NPW	SW-846 8270C	Bis (2-chloroisopropyl) ether
NPW	SW-846 8270C	Chlorophenyl-phenyl ether (4-)
NPW	SW-846 8270C	Bromophenyl-phenyl ether (4-)
NPW	SW-846 8270C	Dinitrotoluene (2,4-)
NPW	SW-846 8270C	Dinitrotoluene (2,6-)

NPW	SW-846 8270C	Isophorone
NPW	SW-846 8270C	Nitrobenzene
NPW	SW-846 8270C	Butyl benzyl phthalate
NPW	SW-846 8270C	Bis (2-ethylhexyl) phthalate
NPW	SW-846 8270C	Diethyl phthalate
NPW	SW-846 8270C	Dimethyl phthalate
NPW	SW-846 8270C	Di-n-butyl phthalate
NPW	SW-846 8270C	Di-n-octyl phthalate
NPW	SW-846 8270C	Acenaphthene
NPW	SW-846 8270C	Anthracene
NPW	SW-846 8270C	Acenaphthylene
NPW	SW-846 8270C	Benzo(a)anthracene
NPW	SW-846 8270C	Benzo(a)pyrene
NPW	SW-846 8270C	Benzo(b)fluoranthene
NPW	SW-846 8270C	Benzo(ghi)perylene
NPW	SW-846 8270C	Benzo(k)fluoranthene
NPW	SW-846 8270C	Chrysene
NPW	SW-846 8270C	Dibenzo(a,h)anthracene
NPW	SW-846 8270C	Fluoranthene
NPW	SW-846 8270C	Fluorene
NPW	SW-846 8270C	Indeno(1,2,3-cd)pyrene
NPW	SW-846 8270C	Methylnaphthalene (2-)
NPW	SW-846 8270C	Naphthalene
NPW	SW-846 8270C	Phenanthrene
NPW	SW-846 8270C	Pyrene
NPW	SW-846 8270C	Methyl phenol (4-chloro-3-)
NPW	SW-846 8270C	Chlorophenol (2-)
NPW	SW-846 8270C	Dichlorophenol (2,4-)
NPW	SW-846 8270C	Dimethylphenol (2,4-)
NPW	SW-846 8270C	Dinitrophenol (2,4-)
NPW	SW-846 8270C	Dinitrophenol (2-methyl-4,6-)
NPW	SW-846 8270C	Methylphenol (2-)
NPW	SW-846 8270C	Methylphenol (4-)
NPW	SW-846 8270C	Nitrophenol (2-)
NPW	SW-846 8270C	Nitrophenol (4-)
NPW	SW-846 8270C	Pentachlorophenol
NPW	SW-846 8270C	Phenol
NPW	SW-846 8270C	Trichlorophenol (2,4,5-)
NPW	SW-846 8270C	Trichlorophenol (2,4,6-)
NPW	SW-846 8270C	Dichlorobenzene (1,4-)
NPW	SW-846 8270C	Pyridine

NPW	SW-846 8270D	Biphenyl (1,1'-)
NPW	SW-846 8270D	Benzaldehyde
NPW	SW-846 8270D	Caprolactam
NPW	SW-846 8270D	Atrazine
NPW	SW-846 8270D	Phenanthrene
NPW	SW-846 8270D	Pyrene
NPW	SW-846 8270D	Acenaphthene
NPW	SW-846 8270D	Acenaphthylene
NPW	SW-846 8270D	Anthracene
NPW	SW-846 8270D	Benzo(ghi)perylene
NPW	SW-846 8270D	Chrysene
NPW	SW-846 8270D	Methylnaphthalene (1-)
NPW	SW-846 8270D	Methylnaphthalene (2-)
NPW	SW-846 8270D	Naphthalene
NPW	SW-846 8270D	Fluoranthene
NPW	SW-846 8270D	Fluorene
NPW	SW-846 8270D	Methylnaphthalene (1-)
NPW	SW-846 8270D	Nitrodiphenylamine (2-)
NPW	SW-846 8270D	Hexachlorophene
NPW	SW-846 8270D	Diphenylhydrazine (1,2-)
NPW	SW-846 8270D	Decane (n-)
NPW	SW-846 8270D	Octadecane (n-)
NPW	SW-846 8270D	Benzo(a)anthracene
NPW	SW-846 8270D	Benzo(a)pyrene
NPW	SW-846 8270D	Benzo(b)fluoranthene
NPW	SW-846 8270D	Benzo(k)fluoranthene
NPW	SW-846 8270D	Dibenzo(a,h)anthracene
NPW	SW-846 8270D	Indeno(1,2,3-cd)pyrene
NPW	SW-846 8270D	Benzal chloride
NPW	SW-846 8270D	Benzo(j)fluoranthene
NPW	SW-846 8270D	Benzotrichloride
NPW	SW-846 8270D	Benzyl chloride
NPW	SW-846 8270D	Chlorobenzilate
NPW	SW-846 8270D	Dibenz(a,h)acridine
NPW	SW-846 8270D	Dibenzo(a,h)pyrene
NPW	SW-846 8270D	Dibenzo(a,i)pyrene
NPW	SW-846 8270D	Dibenzo(c,g)carbazole (7H-)
NPW	SW-846 8270D	Pentachloroethane
NPW	SW-846 8270D	Tetrachlorobenzene (1,2,3,4-)
NPW	SW-846 8270D	Tetrachlorobenzene (1,2,3,5-)
NPW	SW-846 8270D	Benzyl alcohol

NPW	SW-846 8270D	Acetophenone
NPW	SW-846 8270D	Acetylaminofluorene (2-)
NPW	SW-846 8270D	Aminobiphenyl (4-)
NPW	SW-846 8270D	Aramite
NPW	SW-846 8270D	Chloronaphthalene (1-)
NPW	SW-846 8270D	Diallate (cis)
NPW	SW-846 8270D	Diallate (trans)
NPW	SW-846 8270D	Dibenzo(a,e)pyrene
NPW	SW-846 8270D	Dibenz(a,j)acridine
NPW	SW-846 8270D	Dichlorophenol (2,6-)
NPW	SW-846 8270D	Dimethoate
NPW	SW-846 8270D	Dimethylaminoazobenzene
NPW	SW-846 8270D	Dimethylbenz(a)anthracene (7,12-)
NPW	SW-846 8270D	Dimethyl benzidine (3,3-)
NPW	SW-846 8270D	Dinitrobenzene (1,3-)
NPW	SW-846 8270D	Dinoseb
NPW	SW-846 8270D	Disulfoton
NPW	SW-846 8270D	Famphur
NPW	SW-846 8270D	Isodrin
NPW	SW-846 8270D	Isosafrole (cis-)
NPW	SW-846 8270D	Isosafrole (trans-)
NPW	SW-846 8270D	Kepone
NPW	SW-846 8270D	Methanesulfonate (Ethyl-)
NPW	SW-846 8270D	Methanesulfonate (Methyl-)
NPW	SW-846 8270D	Methapyrilene
NPW	SW-846 8270D	Methylcholanthrene (3-)
NPW	SW-846 8270D	Napthoquinone (1,4-)
NPW	SW-846 8270D	Napththylamine (1-)
NPW	SW-846 8270D	Napththylamine (2-)
NPW	SW-846 8270D	N-Nitroso-di-n-butylamine
NPW	SW-846 8270D	N-Nitrosomorpholine
NPW	SW-846 8270D	N-Nitrosopiperidine
NPW	SW-846 8270D	Parathion
NPW	SW-846 8270D	Parathion methyl
NPW	SW-846 8270D	Pentachlorobenzene
NPW	SW-846 8270D	Pentachloronitrobenzene
NPW	SW-846 8270D	Phenacetin
NPW	SW-846 8270D	Phenylenediamine (1,4-)
NPW	SW-846 8270D	Phenylethylamine (alpha, alpha-Dimethyl)
NPW	SW-846 8270D	Phorate
NPW	SW-846 8270D	Phosphorothioate (O,O,O-triethyl)

NPW	SW-846 8270D	Phosphorothioate (O,O-diethyl-O-2-pyrazinyl) [Thionazin]
NPW	SW-846 8270D	Picoline (2-)
NPW	SW-846 8270D	Pronamide
NPW	SW-846 8270D	Quinoline -1-Oxide (4-Nitro)
NPW	SW-846 8270D	Safrole
NPW	SW-846 8270D	Sulfotepp
NPW	SW-846 8270D	Tetrachlorobenzene (1,2,4,5-)
NPW	SW-846 8270D	Tetrachlorophenol (2,3,4,6-)
NPW	SW-846 8270D	Toluidine (2-) (2-Methylaniline)
NPW	SW-846 8270D	Toluidine (5-nitro-2-)
NPW	SW-846 8270D	Trinitrobenzene (1,3,5-)
NPW	SW-846 8270D	N-Nitrosodiethylamine
NPW	SW-846 8270D	N-Nitrosopyrrolidine
NPW	SW-846 8270D	Diphenylamine
NPW	SW-846 8270D	Carbazole
NPW	SW-846 8270D	Dichlorobenzene (1,2-)
NPW	SW-846 8270D	Dichlorobenzene (1,3-)
NPW	SW-846 8270D	N-Nitrosodimethylamine
NPW	SW-846 8270D	N-Nitroso-di-n-propylamine
NPW	SW-846 8270D	N-Nitrosomethylethylamine
NPW	SW-846 8270D	Benzidine
NPW	SW-846 8270D	Aniline
NPW	SW-846 8270D	Hexachloropropene
NPW	SW-846 8270D	Dibenzofuran
NPW	SW-846 8270D	Benzoic acid
NPW	SW-846 8270D	N-Nitrosodiphenylamine
NPW	SW-846 8270D	Dichlorobenzidine (3,3'-)
NPW	SW-846 8270D	Chloroaniline (4-)
NPW	SW-846 8270D	Nitroaniline (2-)
NPW	SW-846 8270D	Nitroaniline (3-)
NPW	SW-846 8270D	Nitroaniline (4-)
NPW	SW-846 8270D	Chloronaphthalene (2-)
NPW	SW-846 8270D	Hexachlorobenzene
NPW	SW-846 8270D	Hexachlorobutadiene (1,3-)
NPW	SW-846 8270D	Hexachlorocyclopentadiene
NPW	SW-846 8270D	Hexachloroethane
NPW	SW-846 8270D	Trichlorobenzene (1,2,4-)
NPW	SW-846 8270D	Bis (2-chloroethoxy) methane
NPW	SW-846 8270D	Bis (2-chloroethyl) ether
NPW	SW-846 8270D	Bis (2-chloroisopropyl) ether

NPW	SW-846 8270D	Chlorophenyl-phenyl ether (4-)
NPW	SW-846 8270D	Bromophenyl-phenyl ether (4-)
NPW	SW-846 8270D	Dinitrotoluene (2,4-)
NPW	SW-846 8270D	Dinitrotoluene (2,6-)
NPW	SW-846 8270D	Isophorone
NPW	SW-846 8270D	Nitrobenzene
NPW	SW-846 8270D	Butyl benzyl phthalate
NPW	SW-846 8270D	Bis (2-ethylhexyl) phthalate
NPW	SW-846 8270D	Diethyl phthalate
NPW	SW-846 8270D	Dimethyl phthalate
NPW	SW-846 8270D	Di-n-butyl phthalate
NPW	SW-846 8270D	Di-n-octyl phthalate
NPW	SW-846 8270D	Acenaphthene
NPW	SW-846 8270D	Anthracene
NPW	SW-846 8270D	Acenaphthylene
NPW	SW-846 8270D	Benzo(a)anthracene
NPW	SW-846 8270D	Benzo(a)pyrene
NPW	SW-846 8270D	Benzo(b)fluoranthene
NPW	SW-846 8270D	Benzo(ghi)perylene
NPW	SW-846 8270D	Benzo(k)fluoranthene
NPW	SW-846 8270D	Chrysene
NPW	SW-846 8270D	Dibenzo(a,h)anthracene
NPW	SW-846 8270D	Fluoranthene
NPW	SW-846 8270D	Fluorene
NPW	SW-846 8270D	Indeno(1,2,3-cd)pyrene
NPW	SW-846 8270D	Methylnaphthalene (2-)
NPW	SW-846 8270D	Naphthalene
NPW	SW-846 8270D	Phenanthrene
NPW	SW-846 8270D	Pyrene
NPW	SW-846 8270D	Methyl phenol (4-chloro-3-)
NPW	SW-846 8270D	Chlorophenol (2-)
NPW	SW-846 8270D	Dichlorophenol (2,4-)
NPW	SW-846 8270D	Dimethylphenol (2,4-)
NPW	SW-846 8270D	Dinitrophenol (2,4-)
NPW	SW-846 8270D	Dinitrophenol (2-methyl-4,6-)
NPW	SW-846 8270D	Methylphenol (2-)
NPW	SW-846 8270D	Methylphenol (4-)
NPW	SW-846 8270D	Nitrophenol (2-)
NPW	SW-846 8270D	Nitrophenol (4-)
NPW	SW-846 8270D	Pentachlorophenol
NPW	SW-846 8270D	Phenol

NPW	SW-846 8270D	Trichlorophenol (2,4,5-)
NPW	SW-846 8270D	Trichlorophenol (2,4,6-)
NPW	SW-846 8270D	Dichlorobenzene (1,4-)
NPW	SW-846 8270D	Pyridine
NPW	SW-846 8310	Acenaphthene
NPW	SW-846 8310	Acenaphthylene
NPW	SW-846 8310	Anthracene
NPW	SW-846 8310	Benzo(a)anthracene
NPW	SW-846 8310	Benzo(a)pyrene
NPW	SW-846 8310	Benzo(b)fluoranthene
NPW	SW-846 8310	Benzo(ghi)perylene
NPW	SW-846 8310	Benzo(k)fluoranthene
NPW	SW-846 8310	Chrysene
NPW	SW-846 8310	Dibenzo(a,h)anthracene
NPW	SW-846 8310	Fluoranthene
NPW	SW-846 8310	Fluorene
NPW	SW-846 8310	Indeno(1,2,3-cd)pyrene
NPW	SW-846 8310	Naphthalene
NPW	SW-846 8310	Phenanthrene
NPW	SW-846 8310	Pyrene
NPW	SW-846 8330	Nitroglycerine
NPW	SW-846 8330	Guanidine nitrate
NPW	SW-846 8330	PETN
NPW	SW-846 8330	HMX
NPW	SW-846 8330	RDX
NPW	SW-846 8330	Trinitrobenzene (1,3,5-)
NPW	SW-846 8330	Dinitrobenzene (1,3-)
NPW	SW-846 8330	Tetryl
NPW	SW-846 8330	Nitrobenzene
NPW	SW-846 8330	Trinitrotoluene (2,4,6-)
NPW	SW-846 8330	Dinitrotoluene (4-amino-2,6-)
NPW	SW-846 8330	Dinitrotoluene (2-amino-4,6-)
NPW	SW-846 8330	Dinitrotoluene (2,4-)
NPW	SW-846 8330	Dinitrotoluene (2,6-)
NPW	SW-846 8330	Nitrotoluene (2-)
NPW	SW-846 8330	Nitrotoluene (3-)
NPW	SW-846 8330	Nitrotoluene (4-)
NPW	SW-846 8330A	Nitroglycerine
NPW	SW-846 8330A	PETN
NPW	SW-846 8330A	HMX
NPW	SW-846 8330A	RDX

NPW	SW-846 8330A	Trinitrobenzene (1,3,5-)
NPW	SW-846 8330A	Dinitrobenzene (1,3-)
NPW	SW-846 8330A	Tetryl
NPW	SW-846 8330A	Nitrobenzene
NPW	SW-846 8330A	Trinitrotoluene (2,4,6-)
NPW	SW-846 8330A	Dinitrotoluene (4-amino-2,6-)
NPW	SW-846 8330A	Dinitrotoluene (2-amino-4,6-)
NPW	SW-846 8330A	Dinitrotoluene (2,4-)
NPW	SW-846 8330A	Dinitrotoluene (2,6-)
NPW	SW-846 8330A	Nitrotoluene (2-)
NPW	SW-846 8330A	Nitrotoluene (3-)
NPW	SW-846 8330A	Nitrotoluene (4-)
NPW	SW-846 9010C	Cyanide - amenable to Cl2
NPW	SW-846 9010C	Cyanide
NPW	SW-846 9012B	Cyanide
NPW	SW-846 9020B	Total organic halides (TOX)
NPW	SW-846 9030B	Sulfides, acid sol. & insol.
NPW	SW-846 9034	Sulfides, acid sol. & insol.
NPW	SW-846 9040B	Corrosivity - pH waste, >20% water
NPW	SW-846 9040B	pH
NPW	SW-846 9040C	Corrosivity - pH waste, >20% water
NPW	SW-846 9040C	pH
NPW	SW-846 9040C	pH - waste, >20% water
NPW	SW-846 9050A	Specific conductance
NPW	SW-846 9056	Bromide
NPW	SW-846 9056	Nitrite
NPW	SW-846 9056	Sulfate
NPW	SW-846 9056	Nitrate
NPW	SW-846 9056	Chloride
NPW	SW-846 9056	Fluoride
NPW	SW-846 9056A	Bromide
NPW	SW-846 9056A	Nitrite
NPW	SW-846 9056A	Sulfate
NPW	SW-846 9056A	Nitrate
NPW	SW-846 9056A	Chloride
NPW	SW-846 9056A	Fluoride
NPW	SW-846 9060	Total organic carbon (TOC)
NPW	SW-846 9060A	Total organic carbon (TOC)
NPW	SW-846 9066	Phenols
NPW	User Defined 5030C	Volatile organics
NPW	User Defined 8260C	Hexane (n-)

NPW	User Defined 9010B	Cyanide - amenable to Cl2
NPW	User Defined 9010B	Cyanide
NPW	User Defined 9012A	Cyanide
NPW	User Defined ASTM D93	Ignitability
NPW	User Defined CA LUFT - diesel	Petroleum Organics
NPW	User Defined CA LUFT - diesel	Petroleum Organics
NPW	User Defined EPA 1657	Parathion ethyl
NPW	User Defined EPA 1657	Azinphos methyl
NPW	User Defined EPA 1657	Demeton (o-)
NPW	User Defined EPA 1657	Demeton (s-)
NPW	User Defined EPA 1657	Diazinon
NPW	User Defined EPA 1657	Disulfoton
NPW	User Defined EPA 1657	Malathion
NPW	User Defined EPA 1657	Parathion methyl
NPW	User Defined EPA 353.2 Modified	Nitrocellulose
NPW	User Defined EPA 624	Dichlorodifluoromethane
NPW	User Defined LUFT	Xylene (m-)
NPW	User Defined LUFT	Xylene (o-)
NPW	User Defined LUFT	Xylene (p-)
NPW	User Defined LUFT	Benzene
NPW	User Defined LUFT	Ethylbenzene
NPW	User Defined LUFT	Toluene
NPW	User Defined LUFT	Xylenes (total)
NPW	User Defined LUFT	Methyl tert-butyl ether
NPW	User Defined MA-DEP-EPH, TN-EPH, WI DRO, NW TPH Dx	Diesel range organic
NPW	User Defined MA-DEP-VPH, WI GRO, NW TPH Gx	Gasoline range organic
NPW	User Defined NWTPH-Dx, NWTPH-Gx, NWTPHID	Petroleum Organics
NPW	User Defined SM 6200 B	Butanone (2-)
NPW	User Defined SM 6200 B	Carbon disulfide
NPW	User Defined SM 6200 B	Isopropanol
NPW	User Defined SM 6200 B	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
NPW	User Defined SM 6200 B	Vinyl acetate
NPW	User Defined SM 6200 B	Acetonitrile
NPW	User Defined SM 6200 B	Hexanone (2-)
NPW	User Defined SM 6200 B	Methyl iodide
NPW	User Defined SM 6200 B	Dibromoethane (1,2-) (EDB)
NPW	User Defined SM 6200 B	Dichlorodifluoromethane
NPW	User Defined SM 6200 B	Dichloroethene (cis-1,2-)

NPW	User Defined SM 6200 B	Hexane (n-)
NPW	User Defined SM 6200 B	Methyl isobutyl ketone (MIBK)
NPW	User Defined SM 6200 B	Tetrahydrofuran
NPW	User Defined SM 6200 B	Styrene
NPW	User Defined SM 6200 B	Xylene (o-)
NPW	User Defined SM 6200 B	Acetone
NPW	User Defined SM 6200 B	Ethyl acetate
NPW	User Defined SM 6200 B	Methyl tert-butyl ether
NPW	User Defined SM 6200 B	Tert-butyl alcohol
NPW	User Defined SM 6200 B	Xylenes (total)
NPW	User Defined SM 6200 B	Benzene
NPW	User Defined SM 6200 B	Bromodichloromethane
NPW	User Defined SM 6200 B	Bromoform
NPW	User Defined SM 6200 B	Bromomethane
NPW	User Defined SM 6200 B	Carbon tetrachloride
NPW	User Defined SM 6200 B	Chlorobenzene
NPW	User Defined SM 6200 B	Chloroethane
NPW	User Defined SM 6200 B	Chloroethyl vinyl ether (2-)
NPW	User Defined SM 6200 B	Chloroform
NPW	User Defined SM 6200 B	Chloromethane
NPW	User Defined SM 6200 B	Dibromochloromethane
NPW	User Defined SM 6200 B	Dichlorobenzene (1,2-)
NPW	User Defined SM 6200 B	Dichlorobenzene (1,3-)
NPW	User Defined SM 6200 B	Dichlorobenzene (1,4-)
NPW	User Defined SM 6200 B	Dichloroethane (1,1-)
NPW	User Defined SM 6200 B	Dichloroethane (1,2-)
NPW	User Defined SM 6200 B	Dichloroethene (1,1-)
NPW	User Defined SM 6200 B	Dichloroethene (trans-1,2-)
NPW	User Defined SM 6200 B	Dichloropropane (1,2-)
NPW	User Defined SM 6200 B	Dichloropropene (cis-1,3-)
NPW	User Defined SM 6200 B	Dichloropropene (trans-1,3-)
NPW	User Defined SM 6200 B	Ethylbenzene
NPW	User Defined SM 6200 B	Methylene chloride (Dichloromethane)
NPW	User Defined SM 6200 B	Tetrachloroethane (1,1,2,2-)
NPW	User Defined SM 6200 B	Tetrachloroethene
NPW	User Defined SM 6200 B	Toluene
NPW	User Defined SM 6200 B	Trichloroethane (1,1,1-)
NPW	User Defined SM 6200 B	Trichloroethane (1,1,2-)
NPW	User Defined SM 6200 B	Trichloroethene
NPW	User Defined SM 6200 B	Trichlorofluoromethane
NPW	User Defined SM 6200 B	Vinyl chloride

NPW	User Defined SM 6200C 20th ED	Benzene
NPW	User Defined SM 6200C 20th ED	Ethylbenzene
NPW	User Defined SM 6200C 20th ED	Methyl tert-butyl ether
NPW	User Defined SM 6200C 20th ED	Tert-butyl alcohol
NPW	User Defined SM 6200C 20th ED	Toluene
NPW	User Defined SM 6200C 20th ED	Xylenes (total)
NPW	User Defined SM 6630C	Chlordane (alpha)
NPW	User Defined SM 6630C	Chlordane (gamma)
NPW	User Defined SM 6630C	Hexachlorobenzene
NPW	User Defined SM 6630C	Endrin aldehyde
NPW	User Defined SM 6630C	Endrin ketone
NPW	User Defined SM 6640B	Dinoseb
NPW	User Defined SM 6640B 18/19th ED	Dicamba
NPW	User Defined SW846 8260B & 8260C	Gasoline range organic
NPW	User Defined SW-846 8330	Nitroguanidine
NPW	User Defined TX 1005, TX 1006, CT ETPH, NW TPH ID	Petroleum Organics
SCM		Perchlorate
SCM	ASTM D240	Heat of combustion (BTU)
SCM	ASTM D5468 and D482	% ash
SCM	ASTM F1647-02A	Total organic carbon (TOC)
SCM	EPA 300.0	Guanidine nitrate
SCM	Other FL - PRO	Petroleum Organics
SCM	Other IA - OA-1	Petroleum Organics
SCM	Other IA - OA-2	Petroleum Organics
SCM	Other NJDEP EPH 10/08, Rev. 3	Extractable Petroleum Hydrocarbons
SCM	Other NJDEP EPH 10/08, Rev. 3	Extractable Petroleum Hydrocarbons
SCM	Other NJ-OQA-QAM-025, Rev. 7	Petroleum Organics
SCM	Other USDA-LOI (Loss on ignition)	Total organic carbon (TOC)
SCM	Other Walkley Black	Total organic carbon (TOC)
SCM	SM 2540 G SM 18th Ed.	Total, fixed, and volatile solids (SQAR)
SCM	SM 9222D-97 (Class B only) plus EPA 625/R-92/013 App. F	Fecal coliform
SCM	SM 9260 D plus EPA 625/R-92/013 Appendix F	Salmonella sp. Bacteria
SCM	SW-846 1010	Ignitability
SCM	SW-846 1010A	Ignitability
SCM	SW-846 1030	Ignitability of solids
SCM	SW-846 1110	Corrosivity toward steel
SCM	SW-846 1110A	Corrosivity toward steel

SCM	SW-846 1310A	Metals - organics
SCM	SW-846 1310B	Metals - organics
SCM	SW-846 1311	Volatile organics
SCM	SW-846 1311	Semivolatile organics
SCM	SW-846 1311	Metals
SCM	SW-846 1312	Metals - organics
SCM	SW-846 1320	Metals - organics
SCM	SW-846 3031	Metals
SCM	SW-846 3040A	Metals
SCM	SW-846 3050B	Metals
SCM	SW-846 3051	Metals
SCM	SW-846 3051A	Metals
SCM	SW-846 3052	Metals
SCM	SW-846 3060A	Metals
SCM	SW-846 3540C	Semivolatile organics
SCM	SW-846 3546	Semivolatile organics
SCM	SW-846 3550B	Semivolatile organics
SCM	SW-846 3550C	Semivolatile organics
SCM	SW-846 3580A	Organics
SCM	SW-846 3585	Organics
SCM	SW-846 3610B	Semivolatile organics
SCM	SW-846 3611B	Semivolatile organics
SCM	SW-846 3620B	Semivolatile organics
SCM	SW-846 3620C	Semivolatile organics
SCM	SW-846 3630C	Semivolatile organics
SCM	SW-846 3660B	Semivolatile organics
SCM	SW-846 3665A	Semivolatile organics
SCM	SW-846 5035A-H	Volatile organics - high conc.
SCM	SW-846 5035A-L	Volatile organics - low conc.
SCM	SW-846 5035H	Volatile organics - high conc.
SCM	SW-846 5035L	Volatile organics - low conc.
SCM	SW-846 6010B	Lithium
SCM	SW-846 6010B	Strontium
SCM	SW-846 6010B	Titanium
SCM	SW-846 6010B	Silver
SCM	SW-846 6010B	Tin
SCM	SW-846 6010B	Aluminum
SCM	SW-846 6010B	Antimony
SCM	SW-846 6010B	Arsenic
SCM	SW-846 6010B	Barium
SCM	SW-846 6010B	Beryllium

SCM	SW-846 6010B	Boron
SCM	SW-846 6010B	Cadmium
SCM	SW-846 6010B	Calcium
SCM	SW-846 6010B	Chromium
SCM	SW-846 6010B	Cobalt
SCM	SW-846 6010B	Copper
SCM	SW-846 6010B	Iron
SCM	SW-846 6010B	Lead
SCM	SW-846 6010B	Magnesium
SCM	SW-846 6010B	Manganese
SCM	SW-846 6010B	Molybdenum
SCM	SW-846 6010B	Nickel
SCM	SW-846 6010B	Potassium
SCM	SW-846 6010B	Selenium
SCM	SW-846 6010B	Sodium
SCM	SW-846 6010B	Thallium
SCM	SW-846 6010B	Vanadium
SCM	SW-846 6010B	Zinc
SCM	SW-846 6010C	Lithium
SCM	SW-846 6010C	Strontium
SCM	SW-846 6010C	Titanium
SCM	SW-846 6010C	Silver
SCM	SW-846 6010C	Tin
SCM	SW-846 6010C	Aluminum
SCM	SW-846 6010C	Antimony
SCM	SW-846 6010C	Arsenic
SCM	SW-846 6010C	Barium
SCM	SW-846 6010C	Beryllium
SCM	SW-846 6010C	Boron
SCM	SW-846 6010C	Cadmium
SCM	SW-846 6010C	Calcium
SCM	SW-846 6010C	Chromium
SCM	SW-846 6010C	Cobalt
SCM	SW-846 6010C	Copper
SCM	SW-846 6010C	Iron
SCM	SW-846 6010C	Lead
SCM	SW-846 6010C	Magnesium
SCM	SW-846 6010C	Manganese
SCM	SW-846 6010C	Molybdenum
SCM	SW-846 6010C	Nickel
SCM	SW-846 6010C	Potassium

SCM	SW-846 6010C	Selenium
SCM	SW-846 6010C	Sodium
SCM	SW-846 6010C	Thallium
SCM	SW-846 6010C	Vanadium
SCM	SW-846 6010C	Zinc
SCM	SW-846 6020	Tin
SCM	SW-846 6020	Barium
SCM	SW-846 6020	Manganese
SCM	SW-846 6020	Molybdenum
SCM	SW-846 6020	Vanadium
SCM	SW-846 6020	Zinc
SCM	SW-846 6020	Beryllium
SCM	SW-846 6020	Nickel
SCM	SW-846 6020	Selenium
SCM	SW-846 6020	Antimony
SCM	SW-846 6020	Arsenic
SCM	SW-846 6020	Cadmium
SCM	SW-846 6020	Chromium
SCM	SW-846 6020	Copper
SCM	SW-846 6020	Lead
SCM	SW-846 6020	Silver
SCM	SW-846 6020	Thallium
SCM	SW-846 6020A	Tin
SCM	SW-846 6020A	Barium
SCM	SW-846 6020A	Manganese
SCM	SW-846 6020A	Molybdenum
SCM	SW-846 6020A	Vanadium
SCM	SW-846 6020A	Zinc
SCM	SW-846 6020A	Beryllium
SCM	SW-846 6020A	Nickel
SCM	SW-846 6020A	Selenium
SCM	SW-846 6020A	Antimony
SCM	SW-846 6020A	Arsenic
SCM	SW-846 6020A	Cadmium
SCM	SW-846 6020A	Chromium
SCM	SW-846 6020A	Copper
SCM	SW-846 6020A	Lead
SCM	SW-846 6020A	Silver
SCM	SW-846 6020A	Thallium
SCM	SW-846 7.3.3.2	Reactivity
SCM	SW-846 7.3.4.2	Reactivity

SCM	SW-846 7196A	Chromium (VI)
SCM	SW-846 7199	Chromium (VI)
SCM	SW-846 7470A	Mercury - liquid waste
SCM	SW-846 7471A	Mercury - solid waste
SCM	SW-846 7471B	Mercury - solid waste
SCM	SW-846 8011	Dibromoethane (1,2-) (EDB)
SCM	SW-846 8011	Dibromo-3-chloropropane (1,2-)
SCM	SW-846 8015B	Ethylene glycol
SCM	SW-846 8015B	Propylene glycol
SCM	SW-846 8015B	Methyl alcohol (Methanol)
SCM	SW-846 8015B	Ethyl alcohol
SCM	SW-846 8015B	Gasoline range organic
SCM	SW-846 8015B	Diesel range organic
SCM	SW-846 8015C	Ethylene glycol
SCM	SW-846 8015C	Propylene glycol
SCM	SW-846 8015D	Ethylene glycol
SCM	SW-846 8015D	Propylene glycol
SCM	SW-846 8015D	Methyl alcohol (Methanol)
SCM	SW-846 8015D	Ethyl alcohol
SCM	SW-846 8015D	Gasoline range organic
SCM	SW-846 8015D	Diesel range organic
SCM	SW-846 8021B	Xylenes (total)
SCM	SW-846 8021B	Methyl tert-butyl ether
SCM	SW-846 8021B	Benzene
SCM	SW-846 8021B	Ethylbenzene
SCM	SW-846 8021B	Toluene
SCM	SW-846 8021B	Xylene (o-)
SCM	SW-846 8021B	Xylene (m-)
SCM	SW-846 8021B	Xylene (p-)
SCM	SW-846 8081A	Alachlor
SCM	SW-846 8081A	Chlordane (alpha)
SCM	SW-846 8081A	Chlordane (gamma)
SCM	SW-846 8081A	Chloroneb
SCM	SW-846 8081A	Chlorothalonil
SCM	SW-846 8081A	Etridiazole
SCM	SW-846 8081A	Hexachlorobenzene
SCM	SW-846 8081A	Hexachlorocyclopentadiene
SCM	SW-846 8081A	Permethrin
SCM	SW-846 8081A	Propachlor
SCM	SW-846 8081A	Trifluralin
SCM	SW-846 8081A	Aldrin

SCM	SW-846 8081A	Alpha BHC
SCM	SW-846 8081A	Beta BHC
SCM	SW-846 8081A	Delta BHC
SCM	SW-846 8081A	Lindane (gamma BHC)
SCM	SW-846 8081A	Chlordane (technical)
SCM	SW-846 8081A	DDD (4,4'-)
SCM	SW-846 8081A	DDE (4,4'-)
SCM	SW-846 8081A	DDT (4,4'-)
SCM	SW-846 8081A	Dieldrin
SCM	SW-846 8081A	Endosulfan I
SCM	SW-846 8081A	Endosulfan II
SCM	SW-846 8081A	Endosulfan sulfate
SCM	SW-846 8081A	Endrin
SCM	SW-846 8081A	Endrin aldehyde
SCM	SW-846 8081A	Endrin ketone
SCM	SW-846 8081A	Heptachlor
SCM	SW-846 8081A	Heptachlor epoxide
SCM	SW-846 8081A	Methoxychlor
SCM	SW-846 8081A	Toxaphene
SCM	SW-846 8081B	Alachlor
SCM	SW-846 8081B	Chlordane (alpha)
SCM	SW-846 8081B	Chlordane (gamma)
SCM	SW-846 8081B	Chloroneb
SCM	SW-846 8081B	Chlorothalonil
SCM	SW-846 8081B	Etridiazole
SCM	SW-846 8081B	Hexachlorobenzene
SCM	SW-846 8081B	Hexachlorocyclopentadiene
SCM	SW-846 8081B	Permethrin
SCM	SW-846 8081B	Propachlor
SCM	SW-846 8081B	Trifluralin
SCM	SW-846 8081B	Aldrin
SCM	SW-846 8081B	Alpha BHC
SCM	SW-846 8081B	Beta BHC
SCM	SW-846 8081B	Delta BHC
SCM	SW-846 8081B	Lindane (gamma BHC)
SCM	SW-846 8081B	Chlordane (technical)
SCM	SW-846 8081B	DDD (4,4'-)
SCM	SW-846 8081B	DDE (4,4'-)
SCM	SW-846 8081B	DDT (4,4'-)
SCM	SW-846 8081B	Dieldrin
SCM	SW-846 8081B	Endosulfan I

SCM	SW-846 8081B	Endosulfan II
SCM	SW-846 8081B	Endosulfan sulfate
SCM	SW-846 8081B	Endrin
SCM	SW-846 8081B	Endrin aldehyde
SCM	SW-846 8081B	Endrin ketone
SCM	SW-846 8081B	Heptachlor
SCM	SW-846 8081B	Heptachlor epoxide
SCM	SW-846 8081B	Methoxychlor
SCM	SW-846 8081B	Toxaphene
SCM	SW-846 8082	PCB 1016
SCM	SW-846 8082	PCB 1221
SCM	SW-846 8082	PCB 1232
SCM	SW-846 8082	PCB 1242
SCM	SW-846 8082	PCB 1248
SCM	SW-846 8082	PCB 1254
SCM	SW-846 8082	PCB 1260
SCM	SW-846 8082A	PCB 1016
SCM	SW-846 8082A	PCB 1221
SCM	SW-846 8082A	PCB 1232
SCM	SW-846 8082A	PCB 1242
SCM	SW-846 8082A	PCB 1248
SCM	SW-846 8082A	PCB 1254
SCM	SW-846 8082A	PCB 1260
SCM	SW-846 8141A	Azinphos methyl
SCM	SW-846 8141A	Chlorpyrifos
SCM	SW-846 8141A	Demeton (o-)
SCM	SW-846 8141A	Demeton (s-)
SCM	SW-846 8141A	Disulfoton
SCM	SW-846 8141A	Bolstar
SCM	SW-846 8141A	Coumaphos
SCM	SW-846 8141A	Dichlorvos
SCM	SW-846 8141A	Dimethoate
SCM	SW-846 8141A	EPN
SCM	SW-846 8141A	Ethoprop
SCM	SW-846 8141A	Fensulfothion
SCM	SW-846 8141A	Fenthion
SCM	SW-846 8141A	Merphos
SCM	SW-846 8141A	Mevinphos
SCM	SW-846 8141A	Naled
SCM	SW-846 8141A	Parathion
SCM	SW-846 8141A	Parathion methyl

SCM	SW-846 8141A	Phorate
SCM	SW-846 8141A	Ronnel
SCM	SW-846 8141A	Stirofos
SCM	SW-846 8141A	Sulfotepp
SCM	SW-846 8141A	TEPP
SCM	SW-846 8141A	Tokuthion [Protothiofos]
SCM	SW-846 8141A	Trichloronate
SCM	SW-846 8141A	Diazinon
SCM	SW-846 8141A	Malathion
SCM	SW-846 8141B	Azinphos methyl
SCM	SW-846 8141B	Chlorpyrifos
SCM	SW-846 8141B	Demeton (o-)
SCM	SW-846 8141B	Demeton (s-)
SCM	SW-846 8141B	Disulfoton
SCM	SW-846 8141B	Bolstar
SCM	SW-846 8141B	Coumaphos
SCM	SW-846 8141B	Dichlorvos
SCM	SW-846 8141B	Dimethoate
SCM	SW-846 8141B	EPN
SCM	SW-846 8141B	Ethoprop
SCM	SW-846 8141B	Fensulfothion
SCM	SW-846 8141B	Fenthion
SCM	SW-846 8141B	Merphos
SCM	SW-846 8141B	Mevinphos
SCM	SW-846 8141B	Naled
SCM	SW-846 8141B	Parathion
SCM	SW-846 8141B	Parathion methyl
SCM	SW-846 8141B	Phorate
SCM	SW-846 8141B	Ronnel
SCM	SW-846 8141B	Stirofos
SCM	SW-846 8141B	Sulfotepp
SCM	SW-846 8141B	TEPP
SCM	SW-846 8141B	Tokuthion [Protothiofos]
SCM	SW-846 8141B	Trichloronate
SCM	SW-846 8141B	Diazinon
SCM	SW-846 8141B	Malathion
SCM	SW-846 8151A	Dicamba
SCM	SW-846 8151A	DB (2,4-)
SCM	SW-846 8151A	Dinoseb
SCM	SW-846 8151A	Dalapon
SCM	SW-846 8151A	Dichlorprop

SCM	SW-846 8151A	D (2,4-)
SCM	SW-846 8151A	T (2,4,5-)
SCM	SW-846 8151A	TP (2,4,5-) (Silvex)
SCM	SW-846 8151A	MCPA
SCM	SW-846 8151A	MCPP
SCM	SW-846 8260B	Hexane (n-)
SCM	SW-846 8260B	Trimethylpentane (2,2,4-)
SCM	SW-846 8260B	Methylnaphthalene (1-)
SCM	SW-846 8260B	Methylnaphthalene (2-)
SCM	SW-846 8260B	Butanol (3,3-Dimethyl-1-)
SCM	SW-846 8260B	Trimethylpentane (2,2,4-)
SCM	SW-846 8260B	Trimethylbenzene (1,2,3-)
SCM	SW-846 8260B	Cyclohexane
SCM	SW-846 8260B	Butanol (1-)
SCM	SW-846 8260B	Nitropropane (2-)
SCM	SW-846 8260B	Butyl formate (t-)
SCM	SW-846 8260B	Methyl acetate
SCM	SW-846 8260B	Pentanol (2-Methyl-2-)
SCM	SW-846 8260B	Amyl alcohol (t-)
SCM	SW-846 8260B	Methylcyclohexane
SCM	SW-846 8260B	Octane (-n)
SCM	SW-846 8260B	tert-Amylmethyl ether [TAME]
SCM	SW-846 8260B	Bromoethane
SCM	SW-846 8260B	Cyclohexanone
SCM	SW-846 8260B	Diisopropyl Ether [DIPE]
SCM	SW-846 8260B	Tetrahydrofuran
SCM	SW-846 8260B	Ethyl-tert-butyl Ether [ETBE]
SCM	SW-846 8260B	Safrole
SCM	SW-846 8260B	Xylene (m-)
SCM	SW-846 8260B	Xylene (o-)
SCM	SW-846 8260B	Xylene (p-)
SCM	SW-846 8260B	Dichloro-2-butene (cis-1,4-)
SCM	SW-846 8260B	Diethyl ether (Ethyl ether)
SCM	SW-846 8260B	Dichloro-2-butene (trans-1,4-)
SCM	SW-846 8260B	Ethanol
SCM	SW-846 8260B	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
SCM	SW-846 8260B	Vinyl acetate
SCM	SW-846 8260B	Pentachloroethane
SCM	SW-846 8260B	Tert-butyl alcohol
SCM	SW-846 8260B	Dioxane (1,4-)
SCM	SW-846 8260B	Bromobenzene

SCM	SW-846 8260B	Butyl benzene (n-)
SCM	SW-846 8260B	Sec-butylbenzene
SCM	SW-846 8260B	Tert-butylbenzene
SCM	SW-846 8260B	Chlorotoluene (2-)
SCM	SW-846 8260B	Chlorotoluene (4-)
SCM	SW-846 8260B	Isopropylbenzene
SCM	SW-846 8260B	Propylbenzene (n-)
SCM	SW-846 8260B	Isopropyltoluene (4-)
SCM	SW-846 8260B	Trichlorobenzene (1,2,3-)
SCM	SW-846 8260B	Trimethylbenzene (1,2,4-)
SCM	SW-846 8260B	Trimethylbenzene (1,3,5-)
SCM	SW-846 8260B	Allyl chloride
SCM	SW-846 8260B	Bromochloromethane
SCM	SW-846 8260B	Butadiene (2-chloro-1,3-)
SCM	SW-846 8260B	Dibromoethane (1,2-) (EDB)
SCM	SW-846 8260B	Dibromomethane
SCM	SW-846 8260B	Dibromo-3-chloropropane (1,2-)
SCM	SW-846 8260B	Dichloropropane (1,3-)
SCM	SW-846 8260B	Dichloropropane (2,2-)
SCM	SW-846 8260B	Dichloropropene (1,1-)
SCM	SW-846 8260B	Trichloropropane (1,2,3-)
SCM	SW-846 8260B	Ethyl acetate
SCM	SW-846 8260B	Ethyl methacrylate
SCM	SW-846 8260B	Methacrylonitrile
SCM	SW-846 8260B	Methyl acrylate
SCM	SW-846 8260B	Methyl methacrylate
SCM	SW-846 8260B	Methyl iodide
SCM	SW-846 8260B	Iso-butyl alcohol
SCM	SW-846 8260B	Isopropanol
SCM	SW-846 8260B	N-Nitroso-di-n-butylamine
SCM	SW-846 8260B	Propionitrile
SCM	SW-846 8260B	Acetonitrile
SCM	SW-846 8260B	Benzene
SCM	SW-846 8260B	Chlorobenzene
SCM	SW-846 8260B	Dichlorobenzene (1,2-)
SCM	SW-846 8260B	Dichlorobenzene (1,3-)
SCM	SW-846 8260B	Dichlorobenzene (1,4-)
SCM	SW-846 8260B	Ethylbenzene
SCM	SW-846 8260B	Toluene
SCM	SW-846 8260B	Xylenes (total)
SCM	SW-846 8260B	Bromodichloromethane

SCM	SW-846 8260B	Bromoform
SCM	SW-846 8260B	Bromomethane
SCM	SW-846 8260B	Carbon tetrachloride
SCM	SW-846 8260B	Chloroethane
SCM	SW-846 8260B	Chloroethyl vinyl ether (2-)
SCM	SW-846 8260B	Chloroform
SCM	SW-846 8260B	Chloromethane
SCM	SW-846 8260B	Dichloropropene (trans-1,3-)
SCM	SW-846 8260B	Dibromochloromethane
SCM	SW-846 8260B	Dichlorodifluoromethane
SCM	SW-846 8260B	Dichloroethane (1,1-)
SCM	SW-846 8260B	Dichloroethane (1,2-)
SCM	SW-846 8260B	Dichloroethene (1,1-)
SCM	SW-846 8260B	Dichloroethene (trans-1,2-)
SCM	SW-846 8260B	Dichloroethene (cis-1,2-)
SCM	SW-846 8260B	Dichloropropane (1,2-)
SCM	SW-846 8260B	Dichloropropene (cis-1,3-)
SCM	SW-846 8260B	Methylene chloride (Dichloromethane)
SCM	SW-846 8260B	Tetrachloroethane (1,1,2,2-)
SCM	SW-846 8260B	Tetrachloroethene
SCM	SW-846 8260B	Trichloroethane (1,1,1-)
SCM	SW-846 8260B	Trichloroethane (1,1,2-)
SCM	SW-846 8260B	Trichloroethene
SCM	SW-846 8260B	Trichlorofluoromethane
SCM	SW-846 8260B	Vinyl chloride
SCM	SW-846 8260B	Acetone
SCM	SW-846 8260B	Carbon disulfide
SCM	SW-846 8260B	Butanone (2-)
SCM	SW-846 8260B	Hexanone (2-)
SCM	SW-846 8260B	Pentanone (4-methyl-2-) (MIBK)
SCM	SW-846 8260B	Methyl tert-butyl ether
SCM	SW-846 8260B	Acrolein
SCM	SW-846 8260B	Acrylonitrile
SCM	SW-846 8260B	Hexachlorobutadiene (1,3-)
SCM	SW-846 8260B	Hexachloroethane
SCM	SW-846 8260B	Naphthalene
SCM	SW-846 8260B	Styrene
SCM	SW-846 8260B	Tetrachloroethane (1,1,1,2-)
SCM	SW-846 8260B	Trichlorobenzene (1,2,4-)
SCM	SW-846 8260C	Trimethylpentane (2,2,4-)
SCM	SW-846 8260C	Methylnaphthalene (1-)

SCM	SW-846 8260C	Methylnaphthalene (2-)
SCM	SW-846 8260C	Butanol (3,3-Dimethyl-1-)
SCM	SW-846 8260C	Trimethylbenzene (1,2,3-)
SCM	SW-846 8260C	Cyclohexane
SCM	SW-846 8260C	Butanol (1-)
SCM	SW-846 8260C	Nitropropane (2-)
SCM	SW-846 8260C	Butyl formate (t-)
SCM	SW-846 8260C	Methyl acetate
SCM	SW-846 8260C	Pentanol (2-Methyl-2-)
SCM	SW-846 8260C	Amyl alcohol (t-)
SCM	SW-846 8260C	Methylcyclohexane
SCM	SW-846 8260C	Octane (-n)
SCM	SW-846 8260C	tert-Amylmethyl ether [TAME]
SCM	SW-846 8260C	Bromoethane
SCM	SW-846 8260C	Cyclohexanone
SCM	SW-846 8260C	Diisopropyl Ether [DIPE]
SCM	SW-846 8260C	Tetrahydrofuran
SCM	SW-846 8260C	Ethyl-tert-butyl Ether [ETBE]
SCM	SW-846 8260C	Xylene (m-)
SCM	SW-846 8260C	Xylene (o-)
SCM	SW-846 8260C	Xylene (p-)
SCM	SW-846 8260C	Dichloro-2-butene (cis-1,4-)
SCM	SW-846 8260C	Diethyl ether (Ethyl ether)
SCM	SW-846 8260C	Dichloro-2-butene (trans-1,4-)
SCM	SW-846 8260C	Ethanol
SCM	SW-846 8260C	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
SCM	SW-846 8260C	Vinyl acetate
SCM	SW-846 8260C	Pentachloroethane
SCM	SW-846 8260C	Tert-butyl alcohol
SCM	SW-846 8260C	Dioxane (1,4-)
SCM	SW-846 8260C	Bromobenzene
SCM	SW-846 8260C	Butyl benzene (n-)
SCM	SW-846 8260C	Sec-butylbenzene
SCM	SW-846 8260C	Tert-butylbenzene
SCM	SW-846 8260C	Chlorotoluene (2-)
SCM	SW-846 8260C	Chlorotoluene (4-)
SCM	SW-846 8260C	Isopropylbenzene
SCM	SW-846 8260C	Propylbenzene (n-)
SCM	SW-846 8260C	Isopropyltoluene (4-)
SCM	SW-846 8260C	Trichlorobenzene (1,2,3-)
SCM	SW-846 8260C	Trimethylbenzene (1,2,4-)

SCM	SW-846 8260C	Trimethylbenzene (1,3,5-)
SCM	SW-846 8260C	Allyl chloride
SCM	SW-846 8260C	Bromochloromethane
SCM	SW-846 8260C	Butadiene (2-chloro-1,3-)
SCM	SW-846 8260C	Dibromoethane (1,2-) (EDB)
SCM	SW-846 8260C	Dibromomethane
SCM	SW-846 8260C	Dibromo-3-chloropropane (1,2-)
SCM	SW-846 8260C	Dichloropropane (1,3-)
SCM	SW-846 8260C	Dichloropropane (2,2-)
SCM	SW-846 8260C	Dichloropropene (1,1-)
SCM	SW-846 8260C	Trichloropropane (1,2,3-)
SCM	SW-846 8260C	Ethyl acetate
SCM	SW-846 8260C	Ethyl methacrylate
SCM	SW-846 8260C	Methacrylonitrile
SCM	SW-846 8260C	Methyl acrylate
SCM	SW-846 8260C	Methyl methacrylate
SCM	SW-846 8260C	Methyl iodide
SCM	SW-846 8260C	Iso-butyl alcohol
SCM	SW-846 8260C	Isopropanol
SCM	SW-846 8260C	N-Nitroso-di-n-butylamine
SCM	SW-846 8260C	Propionitrile
SCM	SW-846 8260C	Acetonitrile
SCM	SW-846 8260C	Benzene
SCM	SW-846 8260C	Chlorobenzene
SCM	SW-846 8260C	Dichlorobenzene (1,2-)
SCM	SW-846 8260C	Dichlorobenzene (1,3-)
SCM	SW-846 8260C	Dichlorobenzene (1,4-)
SCM	SW-846 8260C	Ethylbenzene
SCM	SW-846 8260C	Toluene
SCM	SW-846 8260C	Xylenes (total)
SCM	SW-846 8260C	Bromodichloromethane
SCM	SW-846 8260C	Bromoform
SCM	SW-846 8260C	Bromomethane
SCM	SW-846 8260C	Carbon tetrachloride
SCM	SW-846 8260C	Chloroethane
SCM	SW-846 8260C	Chloroethyl vinyl ether (2-)
SCM	SW-846 8260C	Chloroform
SCM	SW-846 8260C	Chloromethane
SCM	SW-846 8260C	Dichloropropene (trans-1,3-)
SCM	SW-846 8260C	Dibromochloromethane
SCM	SW-846 8260C	Dichlorodifluoromethane

SCM	SW-846 8260C	Dichloroethane (1,1-)
SCM	SW-846 8260C	Dichloroethane (1,2-)
SCM	SW-846 8260C	Dichloroethene (1,1-)
SCM	SW-846 8260C	Dichloroethene (trans-1,2-)
SCM	SW-846 8260C	Dichloroethene (cis-1,2-)
SCM	SW-846 8260C	Dichloropropane (1,2-)
SCM	SW-846 8260C	Dichloropropene (cis-1,3-)
SCM	SW-846 8260C	Methylene chloride (Dichloromethane)
SCM	SW-846 8260C	Tetrachloroethane (1,1,2,2-)
SCM	SW-846 8260C	Tetrachloroethene
SCM	SW-846 8260C	Trichloroethane (1,1,1-)
SCM	SW-846 8260C	Trichloroethane (1,1,2-)
SCM	SW-846 8260C	Trichloroethene
SCM	SW-846 8260C	Trichlorofluoromethane
SCM	SW-846 8260C	Vinyl chloride
SCM	SW-846 8260C	Acetone
SCM	SW-846 8260C	Carbon disulfide
SCM	SW-846 8260C	Butanone (2-)
SCM	SW-846 8260C	Hexanone (2-)
SCM	SW-846 8260C	Pentanone (4-methyl-2-) (MIBK)
SCM	SW-846 8260C	Methyl tert-butyl ether
SCM	SW-846 8260C	Acrolein
SCM	SW-846 8260C	Acrylonitrile
SCM	SW-846 8260C	Hexachlorobutadiene (1,3-)
SCM	SW-846 8260C	Hexachloroethane
SCM	SW-846 8260C	Naphthalene
SCM	SW-846 8260C	Styrene
SCM	SW-846 8260C	Tetrachloroethane (1,1,1,2-)
SCM	SW-846 8260C	Trichlorobenzene (1,2,4-)
SCM	SW-846 8270C	Biphenyl (1,1'-)
SCM	SW-846 8270C	Benzaldehyde
SCM	SW-846 8270C	Caprolactam
SCM	SW-846 8270C	Atrazine
SCM	SW-846 8270C	Phenanthrene
SCM	SW-846 8270C	Pyrene
SCM	SW-846 8270C	Acenaphthene
SCM	SW-846 8270C	Acenaphthylene
SCM	SW-846 8270C	Anthracene
SCM	SW-846 8270C	Benzo(ghi)perylene
SCM	SW-846 8270C	Chrysene
SCM	SW-846 8270C	Methylnaphthalene (1-)

SCM	SW-846 8270C	Methylnaphthalene (2-)
SCM	SW-846 8270C	Naphthalene
SCM	SW-846 8270C	Fluoranthene
SCM	SW-846 8270C	Fluorene
SCM	SW-846 8270C	Methylnaphthalene (1-)
SCM	SW-846 8270C	Nitrodiphenylamine (2-)
SCM	SW-846 8270C	Nitrodiphenylamine (2-)
SCM	SW-846 8270C	Hexachlorophene
SCM	SW-846 8270C	Diphenylhydrazine (1,2-)
SCM	SW-846 8270C	Decane (n-)
SCM	SW-846 8270C	Octadecane (n-)
SCM	SW-846 8270C	Benzo(a)anthracene
SCM	SW-846 8270C	Benzo(a)pyrene
SCM	SW-846 8270C	Benzo(b)fluoranthene
SCM	SW-846 8270C	Benzo(k)fluoranthene
SCM	SW-846 8270C	Dibenzo(a,h)anthracene
SCM	SW-846 8270C	Indeno(1,2,3-cd)pyrene
SCM	SW-846 8270C	Benzal chloride
SCM	SW-846 8270C	Benzo(j)fluoranthene
SCM	SW-846 8270C	Benzotrichloride
SCM	SW-846 8270C	Benzyl chloride
SCM	SW-846 8270C	Chlorobenzilate
SCM	SW-846 8270C	Dibenz(a,h)acridine
SCM	SW-846 8270C	Dibenzo(a,h)pyrene
SCM	SW-846 8270C	Dibenzo(a,i)pyrene
SCM	SW-846 8270C	Dibenzo(c,g)carbazole (7H-)
SCM	SW-846 8270C	Pentachloroethane
SCM	SW-846 8270C	Tetrachlorobenzene (1,2,3,4-)
SCM	SW-846 8270C	Tetrachlorobenzene (1,2,3,5-)
SCM	SW-846 8270C	Benzyl alcohol
SCM	SW-846 8270C	Acetophenone
SCM	SW-846 8270C	Acetylaminofluorene (2-)
SCM	SW-846 8270C	Aminobiphenyl (4-)
SCM	SW-846 8270C	Aramite
SCM	SW-846 8270C	Chloronaphthalene (1-)
SCM	SW-846 8270C	Diallate (cis)
SCM	SW-846 8270C	Diallate (trans)
SCM	SW-846 8270C	Dibenzo(a,e)pyrene
SCM	SW-846 8270C	Dibenz(a,j)acridine
SCM	SW-846 8270C	Dichlorophenol (2,6-)
SCM	SW-846 8270C	Dimethoate

SCM	SW-846 8270C	Dimethylaminoazobenzene
SCM	SW-846 8270C	Dimethylbenz(a)anthracene (7,12-)
SCM	SW-846 8270C	Dimethyl benzidine (3,3-)
SCM	SW-846 8270C	Dinitrobenzene (1,3-)
SCM	SW-846 8270C	Dinoseb
SCM	SW-846 8270C	Disulfoton
SCM	SW-846 8270C	Famphur
SCM	SW-846 8270C	Hexachloropropene
SCM	SW-846 8270C	Isodrin
SCM	SW-846 8270C	Isosafrole (cis-)
SCM	SW-846 8270C	Isosafrole (trans-)
SCM	SW-846 8270C	Kepone
SCM	SW-846 8270C	Methanesulfonate (Ethyl-)
SCM	SW-846 8270C	Methanesulfonate (Methyl-)
SCM	SW-846 8270C	Methapyrilene
SCM	SW-846 8270C	Methylcholanthrene (3-)
SCM	SW-846 8270C	Napthoquinone (1,4-)
SCM	SW-846 8270C	Napththylamine (1-)
SCM	SW-846 8270C	Napththylamine (2-)
SCM	SW-846 8270C	N-Nitroso-di-n-butylamine
SCM	SW-846 8270C	N-Nitrosomorpholine
SCM	SW-846 8270C	N-Nitrosopiperidine
SCM	SW-846 8270C	Parathion
SCM	SW-846 8270C	Parathion methyl
SCM	SW-846 8270C	Pentachlorobenzene
SCM	SW-846 8270C	Pentachloronitrobenzene
SCM	SW-846 8270C	Phenacetin
SCM	SW-846 8270C	Phenylenediamine (1,4-)
SCM	SW-846 8270C	Phenylethylamine (alpha, alpha-Dimethyl)
SCM	SW-846 8270C	Phorate
SCM	SW-846 8270C	Phosphorothioate (O,O,O-triethyl)
SCM	SW-846 8270C	Phosphorothioate (O,O-diethyl-O-2-pyrazinyl) [Thionazin]
SCM	SW-846 8270C	Picoline (2-)
SCM	SW-846 8270C	Pronamide
SCM	SW-846 8270C	Quinoline -1-Oxide (4-Nitro)
SCM	SW-846 8270C	Safrole
SCM	SW-846 8270C	Sulfotepp
SCM	SW-846 8270C	Tetrachlorobenzene (1,2,4,5-)
SCM	SW-846 8270C	Tetrachlorophenol (2,3,4,6-)
SCM	SW-846 8270C	Toluidine (2-) (2-Methylaniline)

SCM	SW-846 8270C	Toluidine (5-nitro-2-)
SCM	SW-846 8270C	Trinitrobenzene (1,3,5-)
SCM	SW-846 8270C	N-Nitrosodiethylamine
SCM	SW-846 8270C	N-Nitrosopyrrolidine
SCM	SW-846 8270C	Diphenylamine
SCM	SW-846 8270C	Carbazole
SCM	SW-846 8270C	Dichlorobenzene (1,2-)
SCM	SW-846 8270C	Dichlorobenzene (1,3-)
SCM	SW-846 8270C	N-Nitrosodimethylamine
SCM	SW-846 8270C	N-Nitroso-di-n-propylamine
SCM	SW-846 8270C	N-Nitrosomethylethylamine
SCM	SW-846 8270C	Benzidine
SCM	SW-846 8270C	Aniline
SCM	SW-846 8270C	Hexachloropropene
SCM	SW-846 8270C	Dibenzofuran
SCM	SW-846 8270C	Benzoic acid
SCM	SW-846 8270C	N-Nitrosodiphenylamine
SCM	SW-846 8270C	Dichlorobenzidine (3,3'-)
SCM	SW-846 8270C	Chloroaniline (4-)
SCM	SW-846 8270C	Nitroaniline (2-)
SCM	SW-846 8270C	Nitroaniline (3-)
SCM	SW-846 8270C	Nitroaniline (4-)
SCM	SW-846 8270C	Chloronaphthalene (2-)
SCM	SW-846 8270C	Hexachlorobenzene
SCM	SW-846 8270C	Hexachlorobutadiene (1,3-)
SCM	SW-846 8270C	Hexachlorocyclopentadiene
SCM	SW-846 8270C	Hexachloroethane
SCM	SW-846 8270C	Trichlorobenzene (1,2,4-)
SCM	SW-846 8270C	Bis (2-chloroethoxy) methane
SCM	SW-846 8270C	Bis (2-chloroethyl) ether
SCM	SW-846 8270C	Bis (2-chloroisopropyl) ether
SCM	SW-846 8270C	Chlorophenyl-phenyl ether (4-)
SCM	SW-846 8270C	Bromophenyl-phenyl ether (4-)
SCM	SW-846 8270C	Dinitrotoluene (2,4-)
SCM	SW-846 8270C	Dinitrotoluene (2,6-)
SCM	SW-846 8270C	Isophorone
SCM	SW-846 8270C	Nitrobenzene
SCM	SW-846 8270C	Butyl benzyl phthalate
SCM	SW-846 8270C	Bis (2-ethylhexyl) phthalate
SCM	SW-846 8270C	Diethyl phthalate
SCM	SW-846 8270C	Dimethyl phthalate

SCM	SW-846 8270C	Di-n-butyl phthalate
SCM	SW-846 8270C	Di-n-octyl phthalate
SCM	SW-846 8270C	Acenaphthene
SCM	SW-846 8270C	Anthracene
SCM	SW-846 8270C	Acenaphthylene
SCM	SW-846 8270C	Benzo(a)anthracene
SCM	SW-846 8270C	Benzo(a)pyrene
SCM	SW-846 8270C	Benzo(b)fluoranthene
SCM	SW-846 8270C	Benzo(ghi)perylene
SCM	SW-846 8270C	Benzo(k)fluoranthene
SCM	SW-846 8270C	Chrysene
SCM	SW-846 8270C	Dibenzo(a,h)anthracene
SCM	SW-846 8270C	Fluoranthene
SCM	SW-846 8270C	Fluorene
SCM	SW-846 8270C	Indeno(1,2,3-cd)pyrene
SCM	SW-846 8270C	Methylnaphthalene (2-)
SCM	SW-846 8270C	Naphthalene
SCM	SW-846 8270C	Phenanthrene
SCM	SW-846 8270C	Pyrene
SCM	SW-846 8270C	Methyl phenol (4-chloro-3-)
SCM	SW-846 8270C	Chlorophenol (2-)
SCM	SW-846 8270C	Dichlorophenol (2,4-)
SCM	SW-846 8270C	Dimethylphenol (2,4-)
SCM	SW-846 8270C	Dinitrophenol (2,4-)
SCM	SW-846 8270C	Dinitrophenol (2-methyl-4,6-)
SCM	SW-846 8270C	Methylphenol (2-)
SCM	SW-846 8270C	Methylphenol (4-)
SCM	SW-846 8270C	Nitrophenol (2-)
SCM	SW-846 8270C	Nitrophenol (4-)
SCM	SW-846 8270C	Pentachlorophenol
SCM	SW-846 8270C	Phenol
SCM	SW-846 8270C	Trichlorophenol (2,4,5-)
SCM	SW-846 8270C	Trichlorophenol (2,4,6-)
SCM	SW-846 8270C	Dichlorobenzene (1,4-)
SCM	SW-846 8270C	Pyridine
SCM	SW-846 8270D	Biphenyl (1,1'-)
SCM	SW-846 8270D	Benzaldehyde
SCM	SW-846 8270D	Caprolactam
SCM	SW-846 8270D	Atrazine
SCM	SW-846 8270D	Phenanthrene
SCM	SW-846 8270D	Pyrene

SCM	SW-846 8270D	Acenaphthene
SCM	SW-846 8270D	Acenaphthylene
SCM	SW-846 8270D	Anthracene
SCM	SW-846 8270D	Benzo(ghi)perylene
SCM	SW-846 8270D	Chrysene
SCM	SW-846 8270D	Methylnaphthalene (1-)
SCM	SW-846 8270D	Methylnaphthalene (2-)
SCM	SW-846 8270D	Naphthalene
SCM	SW-846 8270D	Fluoranthene
SCM	SW-846 8270D	Fluorene
SCM	SW-846 8270D	Methylnaphthalene (1-)
SCM	SW-846 8270D	Nitrodiphenylamine (2-)
SCM	SW-846 8270D	Hexachlorophene
SCM	SW-846 8270D	Diphenylhydrazine (1,2-)
SCM	SW-846 8270D	Decane (n-)
SCM	SW-846 8270D	Octadecane (n-)
SCM	SW-846 8270D	Benzo(a)anthracene
SCM	SW-846 8270D	Benzo(a)pyrene
SCM	SW-846 8270D	Benzo(b)fluoranthene
SCM	SW-846 8270D	Benzo(k)fluoranthene
SCM	SW-846 8270D	Dibenzo(a,h)anthracene
SCM	SW-846 8270D	Indeno(1,2,3-cd)pyrene
SCM	SW-846 8270D	Benzal chloride
SCM	SW-846 8270D	Benzo(j)fluoranthene
SCM	SW-846 8270D	Benzotrichloride
SCM	SW-846 8270D	Benzyl chloride
SCM	SW-846 8270D	Chlorobenzilate
SCM	SW-846 8270D	Dibenz(a,h)acridine
SCM	SW-846 8270D	Dibenzo(a,h)pyrene
SCM	SW-846 8270D	Dibenzo(a,i)pyrene
SCM	SW-846 8270D	Dibenzo(c,g)carbazole (7H-)
SCM	SW-846 8270D	Pentachloroethane
SCM	SW-846 8270D	Tetrachlorobenzene (1,2,3,4-)
SCM	SW-846 8270D	Tetrachlorobenzene (1,2,3,5-)
SCM	SW-846 8270D	Benzyl alcohol
SCM	SW-846 8270D	Acetophenone
SCM	SW-846 8270D	Acetylaminofluorene (2-)
SCM	SW-846 8270D	Aminobiphenyl (4-)
SCM	SW-846 8270D	Aramite
SCM	SW-846 8270D	Chloronaphthalene (1-)
SCM	SW-846 8270D	Diallate (cis)

SCM	SW-846 8270D	Diallate (trans)
SCM	SW-846 8270D	Dibenzo(a,e)pyrene
SCM	SW-846 8270D	Dibenz(a,j)acridine
SCM	SW-846 8270D	Dichlorophenol (2,6-)
SCM	SW-846 8270D	Dimethoate
SCM	SW-846 8270D	Dimethylaminoazobenzene
SCM	SW-846 8270D	Dimethylbenz(a)anthracene (7,12-)
SCM	SW-846 8270D	Dimethyl benzidine (3,3-)
SCM	SW-846 8270D	Dinitrobenzene (1,3-)
SCM	SW-846 8270D	Dinoseb
SCM	SW-846 8270D	Disulfoton
SCM	SW-846 8270D	Famphur
SCM	SW-846 8270D	Isodrin
SCM	SW-846 8270D	Isosafrole (cis-)
SCM	SW-846 8270D	Isosafrole (trans-)
SCM	SW-846 8270D	Kepone
SCM	SW-846 8270D	Methanesulfonate (Ethyl-)
SCM	SW-846 8270D	Methanesulfonate (Methyl-)
SCM	SW-846 8270D	Methapyrilene
SCM	SW-846 8270D	Methylcholanthrene (3-)
SCM	SW-846 8270D	Napthoquinone (1,4-)
SCM	SW-846 8270D	Napththylamine (1-)
SCM	SW-846 8270D	Napththylamine (2-)
SCM	SW-846 8270D	N-Nitroso-di-n-butylamine
SCM	SW-846 8270D	N-Nitrosomorpholine
SCM	SW-846 8270D	N-Nitrosopiperidine
SCM	SW-846 8270D	Parathion
SCM	SW-846 8270D	Parathion methyl
SCM	SW-846 8270D	Pentachlorobenzene
SCM	SW-846 8270D	Pentachloronitrobenzene
SCM	SW-846 8270D	Phenacetin
SCM	SW-846 8270D	Phenylenediamine (1,4-)
SCM	SW-846 8270D	Phenylethylamine (alpha, alpha-Dimethyl)
SCM	SW-846 8270D	Phorate
SCM	SW-846 8270D	Phosphorothioate (O,O,O-triethyl)
SCM	SW-846 8270D	Phosphorothioate (O,O-diethyl-O-2-pyrazinyl) [Thionazin]
SCM	SW-846 8270D	Picoline (2-)
SCM	SW-846 8270D	Pronamide
SCM	SW-846 8270D	Quinoline -1-Oxide (4-Nitro)
SCM	SW-846 8270D	Safrole

SCM	SW-846 8270D	Sulfotepp
SCM	SW-846 8270D	Tetrachlorobenzene (1,2,4,5-)
SCM	SW-846 8270D	Tetrachlorophenol (2,3,4,6-)
SCM	SW-846 8270D	Toluidine (2-) (2-Methylaniline)
SCM	SW-846 8270D	Toluidine (5-nitro-2-)
SCM	SW-846 8270D	Trinitrobenzene (1,3,5-)
SCM	SW-846 8270D	N-Nitrosodiethylamine
SCM	SW-846 8270D	N-Nitrosopyrrolidine
SCM	SW-846 8270D	Diphenylamine
SCM	SW-846 8270D	Carbazole
SCM	SW-846 8270D	Dichlorobenzene (1,2-)
SCM	SW-846 8270D	Dichlorobenzene (1,3-)
SCM	SW-846 8270D	N-Nitrosodimethylamine
SCM	SW-846 8270D	N-Nitroso-di-n-propylamine
SCM	SW-846 8270D	N-Nitrosomethylethylamine
SCM	SW-846 8270D	Benzidine
SCM	SW-846 8270D	Aniline
SCM	SW-846 8270D	Hexachloropropene
SCM	SW-846 8270D	Dibenzofuran
SCM	SW-846 8270D	Benzoic acid
SCM	SW-846 8270D	N-Nitrosodiphenylamine
SCM	SW-846 8270D	Dichlorobenzidine (3,3'-)
SCM	SW-846 8270D	Chloroaniline (4-)
SCM	SW-846 8270D	Nitroaniline (2-)
SCM	SW-846 8270D	Nitroaniline (3-)
SCM	SW-846 8270D	Nitroaniline (4-)
SCM	SW-846 8270D	Chloronaphthalene (2-)
SCM	SW-846 8270D	Hexachlorobenzene
SCM	SW-846 8270D	Hexachlorobutadiene (1,3-)
SCM	SW-846 8270D	Hexachlorocyclopentadiene
SCM	SW-846 8270D	Hexachloroethane
SCM	SW-846 8270D	Trichlorobenzene (1,2,4-)
SCM	SW-846 8270D	Bis (2-chloroethoxy) methane
SCM	SW-846 8270D	Bis (2-chloroethyl) ether
SCM	SW-846 8270D	Bis (2-chloroisopropyl) ether
SCM	SW-846 8270D	Chlorophenyl-phenyl ether (4-)
SCM	SW-846 8270D	Bromophenyl-phenyl ether (4-)
SCM	SW-846 8270D	Dinitrotoluene (2,4-)
SCM	SW-846 8270D	Dinitrotoluene (2,6-)
SCM	SW-846 8270D	Isophorone
SCM	SW-846 8270D	Nitrobenzene

SCM	SW-846 8270D	Butyl benzyl phthalate
SCM	SW-846 8270D	Bis (2-ethylhexyl) phthalate
SCM	SW-846 8270D	Diethyl phthalate
SCM	SW-846 8270D	Dimethyl phthalate
SCM	SW-846 8270D	Di-n-butyl phthalate
SCM	SW-846 8270D	Di-n-octyl phthalate
SCM	SW-846 8270D	Acenaphthene
SCM	SW-846 8270D	Anthracene
SCM	SW-846 8270D	Acenaphthylene
SCM	SW-846 8270D	Benzo(a)anthracene
SCM	SW-846 8270D	Benzo(a)pyrene
SCM	SW-846 8270D	Benzo(b)fluoranthene
SCM	SW-846 8270D	Benzo(ghi)perylene
SCM	SW-846 8270D	Benzo(k)fluoranthene
SCM	SW-846 8270D	Chrysene
SCM	SW-846 8270D	Dibenzo(a,h)anthracene
SCM	SW-846 8270D	Fluoranthene
SCM	SW-846 8270D	Fluorene
SCM	SW-846 8270D	Indeno(1,2,3-cd)pyrene
SCM	SW-846 8270D	Methylnaphthalene (2-)
SCM	SW-846 8270D	Naphthalene
SCM	SW-846 8270D	Phenanthrene
SCM	SW-846 8270D	Pyrene
SCM	SW-846 8270D	Methyl phenol (4-chloro-3-)
SCM	SW-846 8270D	Chlorophenol (2-)
SCM	SW-846 8270D	Dichlorophenol (2,4-)
SCM	SW-846 8270D	Dimethylphenol (2,4-)
SCM	SW-846 8270D	Dinitrophenol (2,4-)
SCM	SW-846 8270D	Dinitrophenol (2-methyl-4,6-)
SCM	SW-846 8270D	Methylphenol (2-)
SCM	SW-846 8270D	Methylphenol (4-)
SCM	SW-846 8270D	Nitrophenol (2-)
SCM	SW-846 8270D	Nitrophenol (4-)
SCM	SW-846 8270D	Pentachlorophenol
SCM	SW-846 8270D	Phenol
SCM	SW-846 8270D	Trichlorophenol (2,4,5-)
SCM	SW-846 8270D	Trichlorophenol (2,4,6-)
SCM	SW-846 8270D	Dichlorobenzene (1,4-)
SCM	SW-846 8270D	Pyridine
SCM	SW-846 8310	Acenaphthene
SCM	SW-846 8310	Acenaphthylene

SCM	SW-846 8310	Anthracene
SCM	SW-846 8310	Benzo(a)anthracene
SCM	SW-846 8310	Benzo(a)pyrene
SCM	SW-846 8310	Benzo(b)fluoranthene
SCM	SW-846 8310	Benzo(ghi)perylene
SCM	SW-846 8310	Benzo(k)fluoranthene
SCM	SW-846 8310	Chrysene
SCM	SW-846 8310	Dibenzo(a,h)anthracene
SCM	SW-846 8310	Fluoranthene
SCM	SW-846 8310	Fluorene
SCM	SW-846 8310	Indeno(1,2,3-cd)pyrene
SCM	SW-846 8310	Naphthalene
SCM	SW-846 8310	Phenanthrene
SCM	SW-846 8310	Pyrene
SCM	SW-846 8330	Nitroglycerine
SCM	SW-846 8330	Guanidine nitrate
SCM	SW-846 8330	PETN
SCM	SW-846 8330	HMX
SCM	SW-846 8330	RDX
SCM	SW-846 8330	Trinitrobenzene (1,3,5-)
SCM	SW-846 8330	Dinitrobenzene (1,3-)
SCM	SW-846 8330	Tetryl
SCM	SW-846 8330	Nitrobenzene
SCM	SW-846 8330	Trinitrotoluene (2,4,6-)
SCM	SW-846 8330	Dinitrotoluene (4-amino-2,6-)
SCM	SW-846 8330	Dinitrotoluene (2-amino-4,6-)
SCM	SW-846 8330	Dinitrotoluene (2,4-)
SCM	SW-846 8330	Dinitrotoluene (2,6-)
SCM	SW-846 8330	Nitrotoluene (2-)
SCM	SW-846 8330	Nitrotoluene (3-)
SCM	SW-846 8330	Nitrotoluene (4-)
SCM	SW-846 8330A	Nitroglycerine
SCM	SW-846 8330A	PETN
SCM	SW-846 8330A	HMX
SCM	SW-846 8330A	RDX
SCM	SW-846 8330A	Trinitrobenzene (1,3,5-)
SCM	SW-846 8330A	Dinitrobenzene (1,3-)
SCM	SW-846 8330A	Tetryl
SCM	SW-846 8330A	Nitrobenzene
SCM	SW-846 8330A	Trinitrotoluene (2,4,6-)
SCM	SW-846 8330A	Dinitrotoluene (4-amino-2,6-)

SCM	SW-846 8330A	Dinitrotoluene (2-amino-4,6-)
SCM	SW-846 8330A	Dinitrotoluene (2,4-)
SCM	SW-846 8330A	Dinitrotoluene (2,6-)
SCM	SW-846 8330A	Nitrotoluene (2-)
SCM	SW-846 8330A	Nitrotoluene (3-)
SCM	SW-846 8330A	Nitrotoluene (4-)
SCM	SW-846 8440	Total rec. petroleum hydrocarbons
SCM	SW-846 9010C	Cyanide - amenable to Cl2
SCM	SW-846 9010C	Cyanide
SCM	SW-846 9012B	Cyanide
SCM	SW-846 9013	Cyanide
SCM	SW-846 9023	Extractable organic halides (EOX)
SCM	SW-846 9030B	Sulfides, acid sol. & insol.
SCM	SW-846 9034	Sulfides, acid sol. & insol.
SCM	SW-846 9040B	Corrosivity - pH waste, >20% water
SCM	SW-846 9040C	Corrosivity - pH waste, >20% water
SCM	SW-846 9040C	pH - waste, >20% water
SCM	SW-846 9045C	pH - soil and waste
SCM	SW-846 9045D	pH - soil and waste
SCM	SW-846 9056	Bromide
SCM	SW-846 9056	Nitrite
SCM	SW-846 9056	Sulfate
SCM	SW-846 9056	Nitrate
SCM	SW-846 9056	Chloride
SCM	SW-846 9056	Fluoride
SCM	SW-846 9056	Orthophosphate
SCM	SW-846 9056A	Bromide
SCM	SW-846 9056A	Nitrite
SCM	SW-846 9056A	Sulfate
SCM	SW-846 9056A	Nitrate
SCM	SW-846 9056A	Chloride
SCM	SW-846 9056A	Fluoride
SCM	SW-846 9056A	Orthophosphate
SCM	SW-846 9060	Total organic carbon (TOC)
SCM	SW-846 9060A	Total organic carbon (TOC)
SCM	SW-846 9071B	Oil & grease - sludge-hem-npm
SCM	SW-846 9071B	Oil & grease - sludge-hem
SCM	SW-846 9095	Free liquid
SCM	SW-846 9095B	Free liquid
SCM	User Defined 8260C	Hexane (n-)
SCM	User Defined 9010B	Cyanide - amenable to Cl2

SCM	User Defined 9010B	Cyanide
SCM	User Defined 9012A	Cyanide
SCM	User Defined 9013A	Cyanide
SCM	User Defined 9095A	Free liquid
SCM	User Defined ASTM D93	Ignitability
SCM	User Defined CA LUFT - diesel	Petroleum Organics
SCM	User Defined CA LUFT - diesel	Petroleum Organics
SCM	User Defined LUFT	Xylene (m-)
SCM	User Defined LUFT	Xylene (o-)
SCM	User Defined LUFT	Xylene (p-)
SCM	User Defined LUFT	Benzene
SCM	User Defined LUFT	Ethylbenzene
SCM	User Defined LUFT	Toluene
SCM	User Defined LUFT	Xylenes (total)
SCM	User Defined LUFT	Methyl tert-butyl ether
SCM	User Defined MA-DEP-EPH, TN-EPH, WI DRO, NW TPH Dx	Diesel range organic
SCM	User Defined MA-DEP-VPH, WI GRO, NW TPH Gx	Gasoline range organic
SCM	User Defined NWTPH-Dx, NWTPH-Gx, NWTPHID	Petroleum Organics
SCM	User Defined SW846 8260B & 8260C	Gasoline range organic
SCM	User Defined SW-846 8330	Nitroguanidine
SCM	User Defined TX 1005, TX 1006, CT ETPH, NW TPH ID	Petroleum Organics

3.4 ABBREVIATIONS/ACRONYMS

The quality department is responsible for setting up and maintaining a list of abbreviations used in the quality manual.

ABBREVIATION	*DESCRIPTION*
A2LA	*AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION*
AIHA	*AMERICAN INDUSTRIAL HYGIENE ASSOCIATION*
BLANK	*See FIELD, TRIP, METHOD, EQUIPMENT*
CAL	*CALIBRATION*
CCB	*CONTINUING CALIBRATION BLANK*
CCV	*CONTINUING CALIBRATION VERIFICATION*
CDOC	*CONTINUING DEMONSTRATION OF CAPABILITY*
COC	*CHAIN OF CUSTODY*
CA	*CORRECTIVE ACTION*
DQO	*DATA QUALITY OBJECTIVES*
DUP	*DUPLICATE*
EB	*EQUIPMENT BLANK*
FB	*FIELD BLANK*
GC	*GAS CHROMATOGRAPHY*
GCMS	*GAS CHROMATOGRAPHY MASS SPECTROMETRY*
HPLC	*HIGH PRESSURE LIQUID CHROMATOGRAPHY*
IC	*ION CHROMATOGRAPHY*
ICP	*INDUCTIVELY COUPLED PLASMA*
ICPMS	*INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY*
ICS	*INTERFERENCE CHECK SAMPLE*
ICV – See SSCV	*INITIAL CALIBRATION VERIFICATION*
IDOC	*INITIAL DEMONSTRATION OF CAPABILITY (SEE ALSO CDOC)*
IDL	*INSTRUMENT DETECTION LIMIT*
IS	*INTERNAL STANDARD*
LCS	*LABORATORY CONTROL SAMPLE (Typically 2ND Source)*
LOD	*LIMIT OF DETECTION*
LDR	*LINEAR DYNAMIC RANGE*
MAT	*MATRIX*
MS	*MATRIX SPIKE*
MSD	*MATRIX SPIKE DUPLICATE*
MDL	*METHOD DETECTION LIMIT*
MB	*METHOD BLANK*
NC	*NEGATIVE CONTROL*
NELAP	*NATIONAL ENVIRONMENTAL LABORATORY ACCREDITATION*
% Rec	*PERCENT RECOVERY*

ABBREVIATION	***DESCRIPTION***
PC	*POSITIVE CONTROL*
PDL	*PRACTICAL DETECTION LIMIT*
PQL	*PRACTICAL QUANTITATION LIMIT also See Reporting Limit (RL)*
PT	*PROFICIENCY TEST SAMPLE*
QUAL	*QUALIFIER*
QA	*QUALITY ASSURANCE*
QAM	*QUALITY ASSURANCE MANUAL*
QAO	*QUALITY ASSURANCE OFFICER*
QC	*QUALITY CONTROL*
RL	*REPORTING LIMIT*
RPD	*RELATIVE PERCENT DIFFERENCE*
RF	*RESPONSE FACTOR*
SSCV	*SECONDARY SOURCE CALIBRATION VERIFICAION*
SOP	*STANDARD OPERATING PROCEDURE*
SRM	*STANDARD REFERENCE MATERIAL*
SURR	*SURROGATE*
UV	*ULTRAVIOLET*
VOC	*VOLATILE ORGANIC COMPOUND*

4.0 MANAGEMENT REQUIREMENTS

4.1 ORGANIZATION

4.1.1 Legal identity

The laboratory is authorized under Title 62 of the Tennessee Code Annotated and is identified as Environmental Science Corporation (d.b.a. ESC Lab Sciences) located at 12065 Lebanon Road, Mount Juliet, TN 37122

4.1.2 Organization

The laboratory is a public entity and is structured to provide environmental support services in compliance with numerous federal, state, and local regulations as well as to meet the analytical needs of the client.

4.1.3 Facilities Under Management System

The scope of the ESC management system is comprehensive and covers all technical and supporting work conducted at all facilities at the primary Lebanon Road location as well as customer support and shipping operations across the US.

4.1.4 Independence

ESC Lab Sciences is an independent analytical facility and therefore remains uninfluenced by external factors, such as financial or political considerations.

4.1.5 Management Responsibilities and Policies

The assignment of responsibilities, authorities, and interrelationships of the personnel who manage, perform, or verify work affecting analytical quality is documented in the job descriptions maintain by the Human Resources department. Management bears specific responsibility for maintenance of the Quality System. This includes defining roles and responsibilities of personnel, approving documents, providing required training, providing a procedure for confidential reporting of data and ensuring data integrity, along with periodically reviewing data, procedures, and documentation. Management ensures that audit findings and corrective actions are completed within required time frames. Alternates are appointed by management during the absence of the Laboratory Manager, Technical Director or the Quality Manager. The organizational structure indicated in this section is designed to minimize the potential for conflicting or undue stresses that might influence the technical judgment of analytical personnel. Additionally, it provides adequate management for consistent supervision of laboratory practices and procedures.

Operations Management is responsible for defining the minimal level of education, qualifications, experience, and skills necessary for all analytical positions in the laboratory and assuring that technical staff has demonstrated capabilities in their tasks. Training is kept up-to-date by periodic review of training records and through employee performance reviews. A brief description of the operations management positions is given below.

4.1.5.1 ***Chief Executive Officer***

Peter Schulert, Bachelor of Science in Chemistry, is the laboratory's Chief Executive Officer (CEO). He joined ESC in 1987 after the completion of his service with the United States Naval Submarine Service. In his five years of nuclear submarine experience in the Navy, Mr. Schulert qualified as an officer. This qualification included supervision of nuclear reactors and power plant operations. His vision for automation and client services has been a key component of ESC's rise to the top ranks of the industry. Mr. Schulert is responsible for developing and executing ESC's strategic plan. Under his leadership, ESC has become a large single location laboratory, with a comprehensive national certification program and industry leading data management tools. In his absence, all operational responsibilities are delegated to the Chief Financial Officer, Laboratory Director, Director of Technical & Regulatory Affairs, and the Chief Information Officer.

4.1.5.2 ***Chief Regulatory Officer***

Judith R. Morgan, Master of Science in Analytical Chemistry and Registered Environmental Manager, is the Chief Regulatory Officer (CRO) and serves as the laboratory Quality Assurance Officer (QAO). She has been serving the environmental industry since 1986 and is a respected expert witness. The majority of her experience is specific to quality and regulatory matters; however, she does have previous experience as an analyst in both organic and inorganic methods. In matters of laboratory QA/QC, she reports directly to Peter Schulert, CEO, thus making her QAO functions separate from laboratory operations. Her primary responsibility is the oversight of administrative and technical operations of the laboratory. She specifies and/or approves all methodologies used in the laboratory and ensures continued accreditation of the laboratory. She is responsible for maintaining the laboratory QA manual, initiating and overseeing audits, activating corrective measures (when necessary), implementing numerous international quality standards and preparing internal QA/QC reports. Additionally, she oversees the Technical Specialist group, which includes personnel who are considered to be experts in one or more facets of the laboratory. The Technical group maintains specific regulatory information that impacts quality, client relations, and strategic marketing. Dixie Marlin assumes responsibility for all QA functions, in the absence of the director.

4.1.5.3 ***Chief Operating Officer***

Eric Johnson, B.S. in Chemistry, is the Chief Operating Officer (COO) and is responsible for the supervision of each laboratory division and the overall compliance of the laboratory to this Quality Manual. Mr. Johnson provides ESC with necessary experience for all aspects of sample handling from sample shipping and receiving through sample disposal. He has been involved in many aspects of environmental analyses since 1991. He coordinates all production areas and is responsible for operational scheduling, process specifications, and implementation of quality standards. He focuses his background and experience on the improvement of existing systems in order to maximize efficiency and improve quality. He reports directly to the CEO. In his absence, all operations responsibilities are delegated to Ken Buckley and then to individual department managers.

4.1.5.4 ***Quality Control Manager***

Dixie Marlin, B.S. in Biology, is the laboratory Quality Control Manager. She has more than 20 years of combined laboratory experience in research, regulatory, and production lab environments. This experience has spanned the environmental lab in both privately owned, university facilities, and Federal Superfund sectors, with additional experience gained in state regulatory agencies. Her primary function is to assist production chemists/technicians regarding quality assurance/control measures, ensure compliance with method requirements and procedures, and perform audits of internal laboratory functions. Where necessary, she identifies, develops, and implements improvement of the laboratory measurement capability to meet the requirements of governing authorities, department programs, and laboratory clients. She is responsible for the supervision of the laboratory QC group and technical specialists. Judith Morgan assumes responsibility for these functions in her absence.

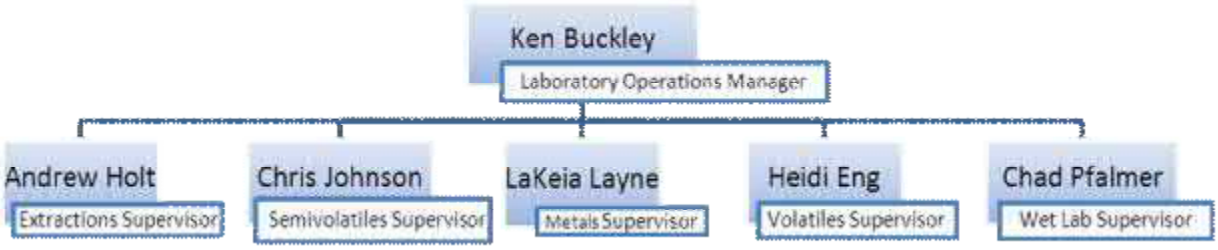
4.1.6 Management System Effectiveness

Senior management ensures that appropriate communication processes are established within the laboratory for implementation of the management system and that communication takes place regarding the effectiveness of the management system.

Figure 4.1 is the corporate organizational chart, which lists key individuals and relevant departmental structure.

Figure 4.1 Corporate Organizational Chart (Subject to change)

Laboratory Department Managers



4.2 MANAGEMENT SYSTEM

4.2.1 Management Documentation

Management system documentation consists of different levels:

- Documented statements of the quality policy (issued under the authority of the chief executive officer) and the quality objectives of this manual
- Documented procedures required by all applicable standards that detail the implementation of requirements and operation guidelines.
- Instructions: details of quality or inspection information and specific instructions for performance of individual tasks.
- Documents needed by the organization to ensure the effective planning, operation and management of its processes
- Records required by all applicable standards per the records procedure.

When the term “documented procedure” appears within this quality manual, the procedure is established, documented, implemented and maintained.

The laboratory maintains its documents in various formats including paper and various electronic formats.

4.2.2 Quality Management Policy

The management of ESC is committed to maintaining a quality assurance/quality control program that allows data generated by ESC, or any subcontractors under ESC's supervision, to meet both required and stated accuracy goals. The most important aspect of the program is to ensure that all activities whether involving sampling, analytical, or engineering activities, are congruent with EPA laboratory practices and regulatory guidelines. Issues relating to the quality program are reviewed during weekly operations meetings with upper management and in quarterly management reviews. ESC personnel who have direct responsibility for overseeing the quality assurance program report to ESC's president.

ESC has a diverse accreditation/certification program, which requires continuous monitoring of changes and modifications within a variety of state and federal organizations. The certification program represents greater than 48 separate state and national certifications. ISO 17025 is maintained as the minimum foundation to meet each program requirement. This requires an extreme dedication to the overall quality system and analytical testing.

4.2.3 Management System Implementation and Improvement

ESC management is committed to the development, implementation, and continual improvement of the laboratory's management system as well as compliance with all statutory and regulatory requirements. These commitments, along with the importance of meeting client requirements, are continually communicated to all levels within the laboratory.

4.2.4 Commitment to Client and Regulatory Requirements

Data Integrity is the result of the processes that work together to assure the production of data of known and documented quality.

The ESC Policy Manual requires a strict adherence to ethics and confidentiality. This policy covers all aspects of the laboratory function from client contact to sample analysis and analytical reporting, invoicing, and archive. Each staff member must maintain a professional attitude towards all colleagues, regulators, auditors, and laboratory clients while continuously striving to improve technical knowledge and professional competence.

ESC supports individual authority and provides the necessary resources for each staff member to carry out their duties. Each staff member is responsible for the identification of departures, from the quality system and/or established analytical procedures, within their area of concern, and for the initiation of actions to prevent or minimize such departures. In addition, ESC strives to ensure that its management and personnel are free from any undue internal and external commercial, financial, and other pressures and influences that may adversely affect the quality of their work.

All ESC personnel, including contract and temporary, are required to sign an "Attestation of Ethics and Confidentiality" at the time of employment and during annual refresher training. This document clearly identifies inappropriate and questionable behavior. Violations of this document result in serious consequences, including prosecution and termination, if necessary. The ESC Policy Manual addresses this subject in detail. See SOP# 010102, *Ethics, Data Integrity, and Confidentiality.*

4.2.4.1 Quality Manual (QAM)

ESC has established and maintains a quality manual that:

- Defines the structure of the management system.
- Makes reference to the quality policy, the supporting procedures (also technical) and instructions.
- Defines the roles and responsibilities of technical and quality staff

The management system documentation is communicated to each laboratory staff member. All employees sign a document, kept in their personnel file, which states that they have read and understood the *Quality Manual*, including the quality policy.

4.2.4.2 Commitment to the QAM and Related Procedures

This Quality Assurance Manual outlines the procedures that have been developed to implement laboratory policies and to fulfill the laboratory's commitment to the client. These procedures are further defined and integrated into ESC's standard operating procedures. The policies are stated such that this manual serves as a QA handbook of responsibilities for all laboratory personnel. The manual is reviewed and approved under the authority of the highest level of laboratory management. Where the *Quality Manual* documents laboratory requirements, a separate SOP or policy is not required. This document is also used as a supplement for project planning, client reference, and personnel training.

4.2.5 Procedure List

A list of the procedures, the instructions and the quality records, which are included in the management system, is maintained by the Quality Department and is available via the ESC intranet.

4.2.6 Management Roles and Responsibilities

4.2.6.1 Programs

The management of ESC is the main support of the quality program. Each manager is aware of the requirements of each external auditing agency and is responsible to ensure that their respective departments meet the requirements of each agency. ESC maintains full compliance and agreement with the following organizations/regulations: A2LA, ISO 17025, AIHA, EPA, GALP/GLP, NELAP, and individual states who carry primacy concerning certification and regulation.

4.2.6.2 ESC Policy Manual

ESC has policies and procedures, in the ESC Policy Manual, to insure that there is no employee involvement in any activities that would diminish confidence in their competence, impartiality, judgment or operational integrity.

All staff members employed by ESC are issued a Company Policy Manual that covers a wide array of topics and defines the expectations and policies of ESC. The Manual addresses both corporate and professional conduct, including confidentiality, professional ethics, and discipline. No deviations from the company policy are permitted without the approval of the CEO.

4.2.7 Management of System Changes

Top management ensures that the integrity of the management system is maintained when changes to the management system are planned and implemented.

4.3 DOCUMENT MANAGEMENT

This Section describes procedures for document management, which includes controlling, distributing, reviewing, and accepting modifications. The purpose of document management is to ensure that adequate instruction is readily available for laboratory employees and to preclude the use of invalid and/or obsolete documents.

The laboratory manages three types of documents: 1) controlled, 2) approved, and 3) obsolete.

A CONTROLLED DOCUMENT is one that is uniquely identified, issued, tracked, and kept current as part of the quality system. Controlled documents may be internal documents or external documents.

APPROVED means reviewed, and either signed and dated, or acknowledged in writing or secure electronic means by the issuing authority(ies).

OBSOLETE DOCUMENTS are documents that have been superseded by more recent versions.

4.3.1 Required Documents

Documents required by the management system, as well as analytical records are managed per the SOP #010103, *Document Control and Distribution Procedure*.

4.3.2 Document Control

The documentation management procedure is established to define the means needed to:

- Approve documents for adequacy prior to issue
- Review, update and re-approve existing documents as necessary
- Ensure that changes and the current revision status of documents are identified
- Ensure that relevant versions of applicable documents are available at points of use
- Ensure that documents remain legible and readily identifiable
- Ensure that documents of external origin are identified and their distribution managed using the documentation master list
- Prevent the unintended use of obsolete documents and to apply suitable identification to them if they are retained for any purpose.

4.3.2.1 Document Review and Approval

Documents are reviewed and approved for use by the individual department managers and QAO, or designee, prior to issue.

Documents are reviewed at least annually or sooner, as deemed necessary to ensure their contents are suitable, comply with the current quality systems requirements and accurately describe current operations.

Approved copies of documents are available at all locations where operations are essential to the effective functions of the laboratory.

4.3.2.2 Document Distribution

Controlled internal documents are uniquely identified with:

1) date of issue
2) revision identification
3) page number
4) total number of pages or a mark to indicate the end of the document
5) the signatures of the issuing authority (i.e. management).

A master list of controlled internal documents is maintained that includes distribution, location, and revision dates. A master list of controlled external documents is also maintained that includes title, version or copyright date, and location. The controlled document list is maintained by the QA Department and is continually updated. All invalid or obsolete documents are removed from circulation and clearly marked to prevent use. Obsolete documents retained for

legal use or historical knowledge preservation are appropriately marked and retained.

4.3.3 Changes to Controlled Documents

4.3.3.1 Review and Approval of Changes

Document changes are re-approved by the original approving authority.

4.3.3.2 Identification of New or Altered Text

Where practicable, the altered text or new text in the draft is identified during the revision or review process to provide for easy identification of the modifications. Pending changes in each revision are indicated in the ESC SOP/Minor Revision Form that is attached to the SOP. Historical changes are described in the SOP Attachment I, Revision History.

4.3.3.3 Procedure for Document Revision

Document revision is controlled under SOP# 010103, *Document Control*. Suggested revisions to electronic documents are presented to management for review and approval. Changes to electronic documents can only be made by the QAO, or designee. The document management process allows for "minor revisions" or amendments to documents where changes are not sufficient to cause a full procedure change. Minor revisions may take the form of handwritten notes on an approved SOP Minor Revision form. Document changes are approved with signature and date by management. The modified document is then copied and distributed, and obsolete documents are removed. Minor revisions to documents are incorporated into the next full revision as soon as practicable.

4.3.3.4 Changes in Electronic Documents

The QA Manual, SOPs, Safety Plan, and other controlled documents are maintained electronically on a protected directory. Access rights are restricted to QA personnel and the IT Director. Electronic copies of current and previous versions of all controlled documents are maintained on the computer network system. They are stored with the same security settings as the most recent version; however previous versions of documents are access controlled to prevent employee use of outdated material. The documents are archived to tape storage with regular back up of the entire network system

4.3.3.5 Standard Operating Procedures

Standard Operating Procedures (SOPs) are written procedures that describe in detail how to accurately and consistently reproduce laboratory processes or provide additional direction for laboratory personnel. Copies of all SOPs are accessible to all personnel. SOPs consist of three types:

- Technical SOPs, pertaining to a laboratory process which have specifically required details
- Administrative SOPs which document the more general organizational procedures.
- Quality SOPs that provide background and process for quality policy.

SOPs do not have to be formal documents with pre-defined section headings and contents. They can be less formal descriptions of procedures described in the *Quality Manual* or other documents.

4.3.3.5.1 Format

Each SOP indicates the effective date, the revision number, and the signature(s) of the QA Department and Department Manager/Laboratory Director. Department Manager approval is also required on technical procedures. Detailed information can be found in SOP# 010100, *Writing, Revising, and Maintaining Standard Operating Procedures*

All Standard Operating Procedures, QA Manuals, and Safety Plans are written in a format that incorporates the document name, date revised, pages included, and section.

Deviations from SOPs and Quality documents are not allowed without the permission of the QAO, or designee. In the event that a deviation is requested, the circumstance is considered and the procedure is evaluated for necessary change and allowance.

Determinative Method SOPs

The laboratory has SOPs for all analytical methods within its scope, which is listed in Table 3.1. Where equipment manuals or published methods accurately reflect laboratory procedures in detail, a separate SOP is not required. Any deviation from a method is documented in the method modifications section of the respective SOP, including both a description of the change made and a technical justification. The deviation is reported to the client. Evidence of bias that is detected in an analytical result is reported to the client along with a defined qualifier that explains the bias. Each determinative method SOP includes or references (as applicable) the following:

- Scope and Application;
- Method Summary and Definitions;
- Health and Safety;
- Sample Preservation, Containers, Handling and Storage;
- Interferences;
- Equipment and Supplies;
- Reagents and Standards;
- Procedure;
- Data Analysis and Calculations;
- Quality Control and Method Performance;
- Data Validation and Corrective Action;
- Pollution Prevention and Waste Management;
- Method Modifications/Clarifications;
- References;
- Procedure Revision/Review History;

4.4 REVIEW OF REQUESTS, TENDERS, AND CONTRACTS

4.4.1 Procedure for Contract Review

When ESC enters into a contract to provide laboratory services, it follows SOP# 020303, *Contract Review*. On receipt of a request or invitation to tender, the clients' requirements are examined by the contract review personnel to establish that the necessary details are adequately outlined and that the laboratory is able and willing to meet them.

4.4.2 Records of Reviews

Records of reviews of requests, tenders and contracts (including significant changes) are maintained. Records are also maintained of pertinent discussions

with the client relating to the client's requirements and the results of the work during the period of execution of the contract.

4.4.3 Subcontracted Work

Clients' requirements for custom analyses and for work subcontracted to other laboratories are reviewed by the appropriate technical staff for logistics and feasibility.

4.4.4 Deviations from the Contract

The client and the affected personnel are informed of any deviation from the contract.

4.4.5 Contract Amendments

If a contract requires amendment after work has commenced, the same contract review process is repeated and any amendments are communicated to all affected parties.

4.5 SUBCONTRACTING

A subcontract laboratory is defined as a laboratory external to ESC, or at a different location than the address indicated on the front cover of this manual, that performs analyses for this laboratory.

4.5.1 Subcontractor Competence

ESC only performs analytical techniques that are within its documented capability, when this is not possible, the laboratory follows SOP# 030209, ***Subcontracting.*** Subcontracting occurs in the special circumstances where technical, safety, or efficiency issues dictate need. When subcontracting analytical services, the laboratory assures work requiring specific accreditation is placed with an accredited laboratory or one that meets applicable statutory and regulatory requirements.

4.5.2 Client Notification

ESC notifies the client of the intent to subcontract the work in writing. The laboratory typically gains the approval of the client to subcontract their work prior to implementation, preferably in writing.

4.5.3 ESC Responsibility

ESC assumes responsibility for the qualifications of the subcontractor (except when the client or an authority specifies a subcontractor) and the client is advised.

All reports, which contain data from subcontracted laboratories, include a statement on the final report, which references the subcontractor laboratory/service. As part of the initial subcontractor approval process, a copy of the applicable certificates and scopes for subcontractor's accreditation/certifications is maintained as evidence of compliance.

4.5.4 Subcontractor List

ESC maintains a list of all approved subcontract laboratories.

4.6 PURCHASING SERVICES AND SUPPLIES

4.6.1 Purchasing Policies and Procedures

ESC maintains SOP# 030210, *Materials Procurement for Analytical Processes,* which describes the purchasing process, including vendor selection and acceptance criteria, for the purchase, storage, and evaluation of supplies and services. Where specifications of outside services and supplies are relevant to the measurement integrity of analyses, ESC uses services and supplies of adequate quality. The various department managers are responsible for ordering supplies/chemicals that meet the method stated requirements.

4.6.2 Quality of Purchased Items

Where assurance of the quality of outside support services or supplies is unavailable, the laboratory uses these items only after they have been inspected or otherwise verified for adequate quality. Records of inspections, verifications, and suppliers are maintained in the laboratory.

4.6.3 Purchasing Documents

Purchasing documents contain data clearly describing the product and/or services.

4.6.4 Approved Supplier List

An approved list of material/service suppliers is maintained where products/services purchased affect the quality of analyses produced by the laboratory.

4.7 SERVICE TO THE CLIENT

The ESC Technical Service Department provides specific project service through the use of Technical Service Representatives (TSRs). The TSR is responsible for all contract requirements and laboratory/client communication, including information concerning schedules, delays, and major deviations in the testing process.

4.7.1 Meeting Client Expectations

The TSR works closely with the client to clarify the client's requests and to monitor the laboratory's performance in relation to the work requested, while ensuring confidentiality to other clients. The laboratory confidentiality policy prohibits divulging or releasing any information to a third party without proper authorization. See SOP# 010102, *Ethics, Data Integrity, and Confidentiality*. All electronic data (storage or transmissions) are kept confidential, based on technology and laboratory limits, as required by client or regulation. All electronic transmissions contain a confidentiality notice that represents the following: *Notice: This communication and any attached files may contain privileged or other confidential information. If you have received this in error, please contact the sender immediately via reply email and immediately delete the message and any attachments without copying or disclosing the contents. Thank you.*

For additional information see SOP# 020301, *TSR (Project Management).*

4.7.2 Client Feedback

Service related feedback is obtained from clients by surveys. This feedback is used to improve the management system, quality system, testing and calibration activities and client services. The feedback is discussed in management reviews.

4.7.3 Client Access

ESC provides reasonable access, as needed by outside parties, to relevant areas of the lab for witnessing tests.

4.7.4 Client Project Information

Clients may be provided supplementary documents, as needed, to further strengthen the project information. This may include: preparation documents, packaging information, verification of calibrations, and certification information.

4.7.5 Communication with the Client

ESC's Technical Service Representatives maintain good communication with outside parties and are able to provide sound advice/guidance in technical matters and opinions/interpretations based on results. Communication with the client, especially in large assignments, is maintained throughout the work. The client is informed of any delays or deviations in the performance of the tests and/or calibrations.

4.8 COMPLAINTS

The purpose of this section is to ensure that customer complaints are addressed and corrected. This includes requests to verify results or analytical data. All client concerns are initially addressed by the Technical Service Representatives. If further resolution is required, the QAO (or designee) and other pertinent personnel, as deemed necessary by the depth of the problem, conduct needed investigations and provide client support. See SOP# 020302, *Client Complaint Resolution Procedure*.

4.8.1 Investigation of Complaints

In the event of a complaint, negative audit finding, or any other circumstance, which raises doubt concerning the laboratory's competence or compliance with required procedures, the laboratory ensures that those areas of activity are promptly investigated. A resolution of the situation is promptly sought and, where necessary, retesting is conducted.

4.8.2 Causes and Corrective Actions

The personnel in the quality department examine all documents and records associated with complaints and the department manager investigates audit findings and other circumstances. This investigation seeks to identify specific root causes and initiate any necessary corrective action.

4.8.3 Documentation

Records of events and the actions taken by the laboratory to resolve issues and to prevent future occurrences are maintained (see Section 4.11).

4.9 CONTROL OF NON-CONFORMING WORK

4.9.1 Policies and Procedures

A nonconformance is an event that does not meet the requirements of the governing documents. Nonconformances can include unacceptable quality control results (See SOP# 030208, *Corrective Action)* or departures from standard operating procedures or test methods. Requests for departures from laboratory procedures are approved by the QAO, or designee, and documented.

Types of non-conformances are:

- Deviations from written procedures that were not pre-approved by QA.
- Changes to an existing SOP that is not included in the current revision
- A single and/or continuous trend of inappropriate habits
- A single and/or continuous trend of bias in the QC results
- Unusual changes in detection limit
- Deficiencies identified during an internal/external audit
- Unacceptable results on performance testing samples
- Valid issues reported by clients, data reviewers, or auditors
- General activities that demonstrate the possibility of a negative impact to the quality of the data

A policy has been established to ensure the use of analytical techniques that do that do not conform to specified requirements are prevented. This control provides for identification, documentation, evaluation, segregation (when practical) and disposition of nonconforming tests/calibrations. The control also calls for notification to the appropriate laboratory divisions. Any non-conforming tests/calibrations are reported to the supervisor of the affected laboratory division who is responsible for corrective actions. Records are documented on corrective action requests.

4.9.2 Correcting Non-conforming Work

The correction action system is used to identify nonconforming tests and/or calibrations. See SOP 030208, *Corrective and Preventive Action.*

4.9.3 Review and Disposition of Nonconforming Tests/Calibrations

Since the laboratory has adopted a continuous improvement philosophy, it has established a procedure for reviewing and disposing of nonconforming tests/calibrations. This procedure includes:

- Reworking the test/calibration to meet the requirements
- Rejecting the test/calibration

- Informing the client (if necessary)

4.10 IMPROVEMENT

The laboratory continually improves the effectiveness of its management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review.

4.11 CORRECTIVE ACTIONS

ESC strives for the continual improvement of its organization and its services. Corrective Action is the process used to eliminate the causes of an existing nonconformity, defect, or other undesirable situation in order to prevent recurrence.

ESC recognizes that the data supplied by the professional staff must be legally and technically defendable. The Regulatory Affairs personnel continually monitor the quality assurance program to ensure that this goal is achieved. Each analyst is responsible for initiating corrective actions in their areas of expertise. The QAO, or designee, and Department Managers administer corrective action approval. It is the Manager's responsibility to evaluate the Corrective Action, appoint the appropriate person within the department to be responsible for completion of the CAR and submit it to the QA Department for processing.

4.11.1 General

The initiation, management, tracking, and closure of corrective actions is described in SOP# 030208, *Corrective and Preventive Action.*

4.11.2 Investigation of Corrective Actions

Each lab division is encouraged to take any corrective action to determine and eliminate the causes of actual nonconformances to the degree appropriate to the magnitude of problems and commensurate with the risks encountered.

4.11.3 Selection and Implementation of Corrective Actions

In addition to SOP# 030208, *Corrective and Preventive Action*, more specific guidance can be found in each determinative method.

In general, the corrective action procedure includes:

- The effective handling of client complaints and reports of nonconformities
- Investigation of the root cause of nonconformities relating to process, service, and management systems, and recording of results
- Determination of the corrective action needed to eliminate the cause of nonconformities

- Application of controls to ensure that corrective action is taken and that it is effective.

4.11.4 Monitoring of Corrective Actions

The closure and follow-up activities of corrective actions are approved and documented in ESC's tracking system to ensure that the actions have been effective in addressing and correcting the problem.

4.11.5 Additional Audits

When the identification of non-conformities or the corrective action investigation casts doubt on compliance with policies and procedures or the management system, laboratory management ensures that appropriate areas of activity are audited in accordance with Section 4.14.1. The results of corrective action are submitted for laboratory management review.

4.11.6 Cessation and Restarting of Work

All technical personnel are capable of invoking a "stop work" order, in the event that a situation impacts data validity or safety. It is the responsibility of the following personnel to (1) evaluate a "stop work" order whenever a severe non-conformance warrants a cessation of analysis and (2) ensure that the cause of the stop work order has been satisfactorily resolved and approve the restarting of work:

- Laboratory Manager/Director
- QA Department
- Technical Director/Supervisor
- Technical Service Representative

Technical directors review corrective action reports and suggest improvements, alternative approaches, and amended/revised procedures, where needed. If the data reported are affected adversely by the nonconformance, the client is notified in writing. The discovery of a nonconformance for results that have already been reported to the client must be immediately evaluated for significance of the issue, its acceptability to the client, and determination of the appropriate corrective action.

4.11.7 Release of Non-conforming Work

The laboratory allows the release of nonconforming data only with approval on a case-by-case basis by the appropriate Technical Director, or their designee. Planned departures from procedures or policies do not require audits or investigations. Permitted departures for nonconformances, such as QC failures, are fully documented and include the reason for the deviation and the impact of

the departure on the data. Any bias indicated in non-conforming work is indicated by the presence of data qualifiers that alert the client to the possible bias.

4.11.8 Other Sources That May Initiate Corrective Action

Deficiencies cited in external assessments, internal quality audits, data reviews, complaints, or managerial reviews are documented and require corrective action. Corrective actions taken are appropriate for the magnitude of the problem and the degree of risk.

Appendix II lists the current federal and state agencies that perform audits of ESC. This table also lists the required performance evaluations that may initiate corrective actions. ESC implements any reasonable corrective action deemed necessary by the regulatory QA/Certification Officers. In addition, the following types of samples may also initiate corrective action: split samples sent to another qualified laboratory, monthly blind field duplicates, quarterly purchased round robin samples, client submitted QC samples and periodic internal blind samples.

4.11.9 Corrective Action Documents

In general, corrective action documents are maintained by the Regulatory Affairs Department. These documents include the following: corrective action resulting from both internal and external audits, corrective action resulting from performance evaluation testing, corrective action as deemed necessary by the QA Department.

Corrective action resulting from analytical failure is kept with the analytical data and is recorded on the bench sheet or raw data. The Department Manager is responsible for making sure that suitable measures have been taken to ensure that the problem is identified and corrected.

Corrective action involving sample receiving is recorded on a Nonconformance form and is then filed with the original Chain of Custody.

4.12 PREVENTIVE ACTIONS

Preventive Action, rather than corrective action, aims at minimizing or eliminating inferior data quality or other nonconformance through scheduled maintenance and review, before the actual nonconformance occurs.

4.12.1 Management of Preventive Actions

ESC Management encourages preventive action measures. Each staff member is empowered to make suggestions for improving or fool-proofing processes throughout ESC. Where process areas show potential for nonconformance,

measures are taken to identify the problem and formulate a plan to implement the defined change needed. The QAO, or designee, reviews any recommended changes before implementation to ensure the effectiveness of the modification.

4.12.2 SOP# 030208, *Corrective and Preventive Action*, is also employed for preventive actions.

In general, the procedure for preventive action includes:

- The use of appropriate sources of information, such as processes and work operations, which affect product or service quality, concessions, audit results, quality records, service reports, and client complaints to detect, analyze, and eliminate potential causes of non-conformities.
- Determination of the steps needed to deal with any problems requiring preventive action
- Initiation of preventive action and application of controls to ensure that it is effective.

Preventive action includes, but is not limited to, review of QC data to identify quality trends, regularly scheduled staff quality meetings, annual budget reviews, annual managerial reviews, scheduled column trimming, running a new LIMS system in tandem with the old system to assure at least one working system, and other actions taken to prevent potential problems.

4.12.3 Trend Analysis

A trend analysis is an investigation that involves the collection of data in a manner that reveals deviations over time. Examples of laboratory processes that can be analyzed for trend analysis are:

- Sample receipt or chain of custody discrepancies
- Sample storage or preservation errors
- Holding time violations
- Instrument calibration
- Control Charts – Charts that are generated from historical data that plot percent recovery vs. time
- Method QC failures and problems

4.13 CONTROL OF RECORDS

Records are a subset of documents, usually data recordings that include annotations, such as daily refrigerator temperatures, posted to laboratory forms, lists, spreadsheets, or analyst notes on a chromatogram. Records may be on any form of media, including electronic and hardcopy. Records allow for the historical reconstruction of laboratory activities related to sample handling and analysis.

4.13.1 General

Technical and quality assurance records are established and maintained to provide evidence of conformity to requirements and of the effective operation of the quality system. Mechanisms are established for records to remain legible, readily identifiable and retrievable. The laboratory maintains a record system appropriate to its needs, records all laboratory activities, and complies with applicable standards or regulations as required.

The laboratory has defined the length of time various records, pertaining to the management system and examination results, are to be retained. Retention time is defined by the nature of examination or specifically for each record. The laboratory retains all original observations, calculations and derived data, calibration records, chain of custody and a copy of the test report for a minimum of ten years, unless otherwise required by regulatory authority.

A documented records procedure SOP# 010103, *Document Control and Distribution Procedure*, and SOP# 020304, *Protection and Transfer of Records*, is established to define the means needed for the identification, storage, protection, retrieval, retention time, transfer, and/or disposition of records.

4.13.2 Technical and Quality Records

NOTE: ALL records/data are stored for a minimum of 10 years, unless otherwise noted.

All hardcopy department logbooks, such as temperature, maintenance, and preparation logs are placed into storage boxes and archived via a unique numbering system, to the ESC storage facility. Additional information regarding reagents/standards can be found in the Standards Logger (Tree) digital archive system. This digital system is backed up according to the ESC IT backup procedure.

Archived information and access logs are protected against fire, theft, loss, environmental deterioration, vermin, and in the case of electronic records, electronic or magnetic sources.

Data Storage Criteria	
Data Type	**Storage Criteria**
Manual Data Wet Chemistry	All manually generated data are stored in specific laboratory analysis workbooks. Each individual analysis is located in a separate notebook which contains all data relating to the test including, calibration curves/data, QC charts/limits, SOP, and completed analysis sheets. These notebooks are centrally located and contain completed data that is filed by analysis and date analyzed. Monthly – Data is removed from the notebook and placed in a dedicated filing cabinet. Semi-annually – Data is removed from the filing cabinet, placed in storage boxes and archived, via a unique numbering system, in the ESC storage facility
Manual Data Prep Labs	All logbooks utilized in manually recording sample preparation information are placed into storage boxes and archived, via a unique numbering system, in the ESC storage facility. This includes organic prep, metals prep, and TCLP.
Manual Data Env. Micro, Mold	All manually generated data is stored in specific laboratory files and notebooks. These files are centrally located and contain completed data that is filed by analysis and date analyzed. Data is placed into storage boxes and (when full) archived, via a unique numbering system, in the ESC storage facility.
All Data Aquatic Toxicity	All manually generated data is stored in specific laboratory files and notebooks. These files are centrally located and contain completed data that is filed by analysis and date analyzed. Data is placed into storage boxes and (when full) archived, via a unique numbering system, in the ESC storage facility. Final reports and Reference Toxicant results are also scanned into ESC's electronic document management system. The data storage device on which this data resides is backed up daily. Data files are archived on to magnetic tape and retained per laboratory policy.
Computerized Data - Organic Dept.	Injection logs are printed and kept in a notebook with the instrument. The instrument data is printed to a secure server and remains in a format that cannot be changed after printed. Upon printing, the data in the original file is generated. This storage system is backed up nightly utilizing a seven-day rotation cycle. The data is immediately available for up to two years. After two years, raw instrument data files are archived onto a separate secure server and kept a minimum of ten years. Original raw data files cannot be edited.
Computerized Data – Inorganic Metals Dept.	All data produced by metals instrumentation is backed up to a secure drive, nightly, utilizing a seven-day rotation cycle. Hard copies are printed and filed by date and instrument. All data is archived on a network attached storage device and is immediately available for up to two years. After two years, raw instrument data files are archived on to a separate secure server and kept a minimum of ten years. Original raw data files cannot be edited.
Final Report Storage - LIMS	The LIMS facilitates access to any finished data and sample information by client code, sample number, and parameter run number. Furthermore, any data pertaining to a sample or client can be obtained. The LIMS also contains the information from the COC such as sample description, time and date collected, sampler ID, container type, preservative, sample receipt data, finished/approved analytical data, analyst, etc. The LIMS Oracle Database is backed up daily on tape. The back up tape is kept in secure storage. While all LIMS data are accessible, data older than six months is moved from the active production database and is available in an archive database.
Final Report Storage - PDF	Copies of all reports are stored according to client code in PDF format on a network attached storage device and are immediately available for up to ten years**.** After ten years data files are archived onto magnetic tape and kept an additional ten years. These reports include chain of custody forms, login confirmation reports, the final approved printed report, invoices and any other associated documents. Samples that require subcontract work also have a copy of the final report in the client file.
Misc. Data Storage	Company records that are not stored on a secure electronic device are placed in storage boxes and archived, via a unique numbering system, in the ESC storage facility. This includes quality records, such as audits, state certifications, PT results, internal audits, corrective actions, training files, logbooks, etc.

4.13.3 Records Disposal

Records that have exceeded the required storage requirement are disposed of through the use of professional records destruction firm. ESC retains the manifest of documents destroyed and files the verification receipt that is generated at the time of destruction. Additional guidance for records disposal is provided in the SOP, Protection and Transfer of records.

4.13.4 Records Transfer

In the event that corporate ownership is transferred or that laboratory activities are terminated for any reason, all records become property of the transferee in accordance with ESC SOP# 020304, ***Protection and Transfer of Laboratory Records.***

4.13.5 Legal Chain of Custody Records

Evidentiary Sample Data are used as legal evidence. Procedures for evidentiary samples are documented in a separate SOP.

4.14 AUDITS

4.14.1 Internal Audits

SOP# 010104, *Internal Audits*, addresses the implementation and maintenance procedure for a comprehensive system of annual internal audits to verify the on-going effectiveness of the management system.

4.14.1.1 The QA Department is responsible for administering the internal audit system per the documented procedures. The department develops a schedule for internal audits according to management system requirements and conducts unscheduled audits (internal and external) when reasons for such audits exist.

4.14.1.2 Audits are conducted utilizing documented checklists and/or audit plans. Audit results are documented in audit reports per established procedures. Copies of all audit reports including completed corrective action requests are forwarded to management of the audited area and maintained by the quality assurance department.

4.14.1.3 Audit plans are structured according to the following:

State/Certifying Agencies - Internal audits are conducted according to the various requirements set forth by the state and international agencies that accredit ESC. In addition, work procured from non-certifying states, also determine other requirements set forth by the state of origin. The audits are conducted to maintain compliance with the following Quality Standards: AIHA LQAP, A2LA, ANSI/ISO 17025, NELAC, and DOD QSM.

Method Specific Criteria – Good Laboratory technique, technical compliance with analytical methods and standard operating procedures, and effectiveness are reviewed during the internal audit. ESC maintains compliance with methods as listed in section 2.1.3.

Data Integrity and Analyst Ethics - In addition to established standard and method related criteria; the internal audit is designed to review the analytical data for integrity and defensibility. Any suspicion of ethics violations result in a confidential investigation involving only the QAO, or designee, Director of Technical & Regulatory Affairs, and any specialist personnel necessary to conduct a complete and thorough investigation. Investigations, of this type, are conducted in a timely manner and all details and supporting documentation are recorded and maintained for a period of at least 10 years. All investigations that result in findings of inappropriate activity are documented and include any disciplinary actions involved, corrective actions taken, and all appropriate notifications to clients. Clients are notified promptly when audit findings cast doubt on the validity of the data.

Support Systems – The internal audit process is also designed to assess support systems that are not a direct part of analytical activities. This includes, but is not limited to, the following:

- Contract Review
- Procurement and Vendor Approval
- Inventory Control
- Document Control
- Subcontracting
- Environmental, Safety, Security, and Health (ESSH)

4.14.1.4 Audit personnel are qualified per documented procedures and do not have direct responsibility for or control over the area being audited.

4.14.1.5 Management personnel responsible for the audited area determine and implement timely corrective actions for any reported nonconformance.

Follow-up audit activities include verification of the corrective actions taken and reporting of the results.

4.14.2 Performance Audits

Performance audits require evaluation of control and blind results. On a quarterly basis, documentation of results and corrective actions are evaluated as part of the management review process.

4.14.3 Proficiency Testing

The laboratory participates in various proficiency testing samples (PT) as required by each accreditation, and obtains test samples from approved providers. Corrective action procedures are initiated for all failed PT samples. All studies are conducted independently and no attempts are made to compare or obtain results from other labs or the provider. Proficiency Testing (PT) or Proficiency Evaluation (PE) samples are treated as typical samples in the normal production process where possible, including the same preparation, calibration, quality control and acceptance criteria, sequence of analytical steps, number of replicates, and sample log-in. PT samples are not analyzed multiple times unless routine environmental samples are analyzed multiple times.

- ***Annual Studies***

Study	***Frequency***	***Vendor***
WP (Water Pollution)	Semi-annually	Environmental Resource Associates
WS (Water Supply)	Semi-annually	Environmental Resource Associates
Matrix – Soil RCRA	Semi-annually	Environmental Resource Associates
Matrix – UST Soil/Water	Semi-annually	Environmental Resource Associates
Matrix – Air Canisters	Semi-annually	Environmental Resource Associates
DMRQA – Chemistry	Annually	Environmental Resource Associates
DMRQA – Aquatic Tox.	Annually	Environmental Resource Associates
ELLAP	Quarterly	AIHA
IHLAP	Quarterly	AIHA
EMLAP	Quarterly	AIHA
EMLAP – Direct Exam	Quarterly	AIHA
EMLAP – Fungal / Bacterial	Triannually	AIHA
Cryptosporidium / Giardia	Quarterly	US EPA
Aquatic Toxicity Performance Evaluation	Annually	North Carolina

- ***Blind Field Duplicates*** **–** ESC collects blind duplicates periodically to evaluate field collection and laboratory precision. ESC routinely receives unmarked field duplicates from clients to evaluate sample batches.

- ***Split Samples*** – ESC periodically participates in split samples with outside laboratories to confirm analytical results. This is performed on a project specific basis.

4.14.4 External Audits

ESC agrees to host on-site system audits from external organizations and currently participates in various system and performance audits. It is the laboratory's policy to cooperate and assist with all external audits, whether performed by clients or an accrediting authority. All external audits are fully documented and tracked to closure.

Management ensures that all areas of the laboratory are accessible to auditors as applicable and that appropriate personnel are available to assist in conducting the audit. Any findings related to an external audit follow corrective action procedures. Management ensures that corrective actions are carried out within the timeframe specified by the auditor(s).

SDWA

The ESC laboratory (EPA No. TN00003) is certified by the State of Tennessee under the Safe Drinking Water Act. The State of Tennessee routinely audits the ESC laboratory procedures, quality control and methods and has found the laboratory practices to be consistent with EPA requirements. ESC is also audited under the Safe Drinking Water Act by Arizona, Iowa, North Carolina, New Jersey - NELAP, and the A2LA. ESC maintains several other DW certifications, which have been granted in reciprocity. ESC participates in WS PE studies in support of drinking water certifications.

CWA/RCRA

ESC is certified for wastewater and solid waste through audits by the following states/organizations: A2LA, Arizona, Iowa, Minnesota, New Jersey (NELAP), North Carolina, OHIO VAP, West Virginia, Wisconsin, and USACE. In addition to Water Pollution or Non-Potable water studies, ESC is required to analyze additional blind samples for West Virginia. The laboratory is also periodically audited by the Metropolitan Government of Nashville and Davidson County and certified for wastewater sampling and analysis. ESC participates in WP Studies, DMR QA program, and Solid Matrix PE studies.

INDUSTRIAL HYGIENE

The American Industrial Hygiene Association routinely audits ESC to maintain certification for analytical support of organic chemical exposure monitoring, microbiological testing and metals exposure activities. ESC currently participates in the required performance testing studies and maintains the quality systems to satisfy the requirements necessary for certification in the following: Environmental Lead (air, soil, paint and wipes), Industrial Hygiene (air filters, diffusive samplers, and sorbent tubes), Environmental Microbiology (fungal/bacterial testing and identification)

CLIENT AUDITS

Due to participation in a number of national contracts, ESC is audited by several clients; who are also ISO certified and are required to assess their suppliers.

ESC is subject to several external audits on an annual basis. The audits cover all disciplines, SDWA, CWA, CAA and RCRA/UST. In addition, the laboratory also participates in additional performance testing, where required by individual clients and for new method development purposes.

4.15 MANAGEMENT REVIEW

4.15.1 Items in Management Review

Regular management review meetings take place quarterly during the months of January, April, July and October and cover the events from the preceding quarter. The Quality Assurance Officer (QAO), the Laboratory Director, and all Department Managers are responsible for attending each meeting. Guidance, including agenda items, is given in ESC SOP# 010105, *Management Review*.

4.15.2 Records of Management Review

The Director of Technical & Regulatory Affairs and QA Department collects objective evidence on the effectiveness of the management system. This includes audit results, client feedback, contract performance data, nonconformance data, problem reports, changes affecting the management system and previous management review reports.

4.15.3 Evaluation

On the basis of this input, the management system is tested for its effectiveness, for its relevance, and for its implementation. In particular, quality objectives and the objectives set within the management system are examined. Adjustments are considered due to changes in the conduct or scope of business.

4.15.4 Improvement

Decisions are made regarding actions needed to improve the effectiveness of the quality management system.

4.15.5 Procedure

Details of this review, how it is be performed and recorded and the associated responsibilities can be found in the procedure for ESC SOP# 010105, *Management Review.*

5.0 TECHNICAL REQUIREMENTS

5.1 GENERAL

5.1.1 ESC recognizes that many factors determine the correctness and reliability of the analyses performed by a laboratory. These factors include contributions from: human factors (5.2), accommodations and environmental conditions (5.3), analytical/calibration methods and method validation (5.4), equipment (5.5), measurement traceability (5.6), and sample management - handling of test/calibration items (5.8).

5.1.2 The extent to which the factors contribute to the total uncertainty of measurement differs considerably between types of analyses. ESC takes into account these factors in developing analytical procedures, in the training and qualifications of personnel, and in the selection and calibration of the equipment utilized.

5.2 PERSONNEL

5.2.1 General Personnel Management

ESC management ensures the competency of all who operate specific equipment, who perform analyses, and who evaluate results and approve data reports. Approved signatories for support documents and final reports are kept by the Regulatory Affairs Department and, likewise, documents are maintained within each analytical department for the analysts. Personnel performing specific tasks are qualified on the basis of appropriate education, training, experience, and/or demonstrated skills, as required.

5.2.2 Training

All training and education requirements are outlined in SOP# 030205, *Technical Training and Personnel Qualifications*. Training requirements for safety and health are listed in the *Chemical Hygiene and Laboratory Safety Plan*. When staff members undergo training, adequate and appropriate supervision by fully trained analysts is provided.

5.2.2.1 Corporate Documents

All employees are required to read relevant corporate documents. At a minimum this includes:

- ESC Policy Manual
- ESC QA Manual
- Chemical Hygiene and Laboratory Safety Plan
- SOPs (As specified/required for work area)

Records of verification are required for each individual and are retained on file for a minimum of 10 years.

5.2.2.2 Specific Documents

Analysts are also required to undergo training specific to their position. This includes the following:

- Documented review & acknowledgement of Method Specific SOPs
- Documented review & acknowledgement of published methods related to the specific SOP
- Documented review & acknowledgement of other supporting methods related to the specific determinative SOP
- Certification Statement of acceptable performance of an Initial Demonstration of Capability (according to method criteria)
- Continuous acceptable performance on daily/batch control samples
- Performance Testing, where required, is reviewed as continued verification of analyst proficiency.
- Educational/training courses are provided where required by the position.
- Certification Statement of acceptable performance of a Continuing Demonstration of Capability (according to method criteria)

Records of verification are required for each individual and are retained on file for a minimum of 10 years.

5.2.2.3 Routine Training

Any routine training and re-training necessary for a person to perform a particular job effectively is specified in job descriptions, process procedures, maintenance procedures, etc., as appropriate.

5.2.2.4 Special Training

Special training required as a result of new technologies, contracts, expanding markets, company-wide improvement programs, new method development, etc. is conducted as the need arises.

5.2.2.5 Annual Training

An annual training plan is established by management and in conjunction with regulatory requirements. The plan is maintained by the Regulatory Affairs Department, which specifies details of the training to be carried out in each department to permit effective implementation of the management system. Managers ensure that the plan is implemented within their areas of responsibility.

5.2.3 General Responsibilities

See Organization Chart in Section 4.0 for more detailed information regarding company organizational structure.

Chemist/Analyst:

- Performs sample analyses
- Verifies detail and accuracy
- Records pertinent information in laboratory notebooks
- Stores all data (files and discs)
- Updates QC charts – where applicable
- Prepares and completes benchsheets/raw data for review

Laboratory Director:

The Laboratory Director is responsible for all operational laboratory activities. The Laboratory Director must approve the *Quality Manual*.

Laboratory Group Leader, Department Manager:

Day to day supervision of technical laboratory operations is the responsibility of these leaders who are full-time members of the staff and who assure reliable data through the following activities: monitoring quality control, corroborating the analysis performed, and approving demonstrations of capability. Additionally they certify that personnel with appropriate educational and/or technical background perform all analyses for which the laboratory is accredited. The laboratory group leader or supervisor oversees analytical raw data, ensures calculation/calibration correctness, and reviews instrument and sample preparation logs.

Laboratory QA Officer (Also called QA Manager)

The QAO has the authority and responsibility for ensuring that the quality system is implemented and followed. The QAO has direct access to the Laboratory Director and is independent of operations.

The QAO routinely reviews QA/QC policies for all analyses to ensure that the data is evaluated within method requirements. The QAO is also responsible for assessing data that is out of compliance and ensuring that necessary corrective action measures are taken and are effective.

***Laboratory QC Manager* (Also called QC Officer, QCO)**

The QCO shares the authority and responsibility for ensuring that the quality system is implemented and followed. The QCO has direct access to the Laboratory Director and is independent of operations.

The QCO routinely reviews QC policies for all analyses to ensure that the data is evaluated within method requirements. The QCO is also responsible for data review and is responsible for ensuring method/program compliance and that necessary corrective action measures are taken, completed, and remain effective.

QC Specialist (QCS)

Each ESC Analytical Division employs the use of a QC Specialist (QCS). This individual has analytical experience in their assigned area and reports to the QCO. Working knowledge of the instrumentation, printouts, and processes is key to successful approval of data being generated in that area. The QCS gives final approval of the initial raw data. The QCS is responsible for the review of data for method compliance. In addition, the application of qualifiers is verified and approved. If the QCS determines a result to be questionable, the data is given to the Department Manager to initiate appropriate action based on the severity of the problem.

Technical Specialist

Technical Specialists are a part of the Regulatory Affairs Department. These individuals have comprehensive experience in their areas of expertise. The Technical Specialist may be called upon for data interpretation, where compliance issues arise. In addition, these individuals often interface with the clients where questions arise concerning methods, data interpretation, and recommendations concerning alternate analyses.

Technical Service Representative (TSR)

The TSR is responsible for final report review. Once the data has completed the laboratory validation steps, the final report is generated. The TSR reviews the data for completeness and any outstanding anomalies. If an error is suspected, the report is delayed until the appropriate Department Managers can be contacted to resolve the question. Each TSR has laboratory experience in one or more departments.

LIMS Specialist

The LIMS Specialist tracks internal sample custody, computerizes data, and stores it in the LIMS system.

5.2.4 Job Descriptions

Employee qualification requirements are maintained by the Human Resources Department and are facilitated through the use of written job descriptions. Educational requirements and experience are included in the job description. The Department Manager determines specific education and experience requirements for individual positions based on the particular department need.

5.2.5 Training Records

Details of any employee training performed at ESC are recorded on training records. Procedural training records are maintained within each department, while policy records are maintained by Human Resources. Training on new or revised Standard Operating Procedures is maintained with the Master copy of the procedure by the Regulatory Affairs Department.

5.3 ACCOMMODATION & FACILITY DESIGN

5.3.1 Laboratory Facilities

The design of the laboratory supports good laboratory practices and does not adversely affect measurement integrity.

5.3.2 Environmental Conditions

All ESC laboratory facilities, analytical areas, energy sources, lighting, heating, and ventilation facilitate proper performance of calibrations and tests. The laboratory ensures that dust, electromagnetic interference, humidity, line voltage, temperature, sound and vibration levels are appropriately controlled for specific measurement results and do not adversely affect accuracy or increase the uncertainty of each measurement.

Environmental conditions are recorded on all data sheets, when monitoring is required. The laboratory documents deviations and corrective actions when environmental conditions are not within specified conditions.

Environmental conditions maintained by the laboratory are within the limits recommended in **ANSI/AIHA Z9.5-2003**. Measurements are not made if environmental conditions deviate from those stated.

Laboratory staff ensures adequate conditions in the facility using the steps listed below:

- Verify that air conditioning, lighting, heating, and ventilation are controlled and monitored.
- Maintain good housekeeping practices to promote a clean, uncluttered laboratory.
- Have sufficient space to minimize the risk of injury to staff and/or damage to standards or equipment
- Maintain a convenient and efficient work environment with effective separation of incompatible activities.
- Limit the amount of paper products used or stored in sensitive and/or clean areas to prevent dust contamination.

5.3.3 Separation of Incompatible Activities

The ESC complex facilitates the physical separation of analytical activities to prevent possible contamination between departments.

Each laboratory structure is specifically designed for the type of analytical activity that it contains. The air handling systems, power supplies, and gas supplies are specific for each laboratory department.

The following areas are designated and maintained under proper conditions and security:

- Sample Receiving
- Sample/supply shipping
- Chemical Storage
- Waste storage/disposal
- Data Handling
- Data Archiving

Routinely, the departments are required to maintain cleanliness and exercise good housekeeping measures to further minimize potential for contamination that could adversely affect analytical processes.

5.3.4 Facilities Access Management

Entrance into any ESC building requires an electronic ID badge with appropriate assigned access. Access is controlled to each area depending on the required personnel, the sensitivity of the operations performed, and possible safety concerns. Chemical/receipt and storage is assigned to the purchasing department and is access controlled by an attendant who organizes and maintains the inventory.

5.3.5 Good Housekeeping

ESC ensures good housekeeping practices in all facilities to maintain a standard of cleanliness necessary for analytical integrity and personnel health and safety. Some areas are periodically monitored to detect and resolve specific contamination and/or safety issues.

5.4 TEST METHODS AND VALIDATION

Method Validation is the confirmation by examination and the provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

5.4.1 General

5.4.1.1 ESC uses appropriate methods and procedures for all analyses within its scope. These include sampling, handling, transport, storage and preparation of items to be analyzed and/or calibrated, as well as statistical techniques for analysis of data and, where appropriate, an estimation of the associated measurement uncertainty.

5.4.1.2 ESC has instructions on the use and operation of all relevant equipment and on the handling and preparation of items for analysis, where the absence of such instructions could jeopardize the results. All instructions, standards, manuals and reference data relevant to the work of the laboratory are maintained current and be made readily available to personnel (see 4.3).

5.4.1.3 Deviation from methods occur only if the deviation has been documented, technically justified, authorized, and accepted by the client.

5.4.2 Selection of Methods

5.4.2.1 The laboratory uses analytical methods, including methods for sampling, which meet the needs of the client and are appropriate for the analyses performed. Methods utilized are preferably those published as international, regional, or national standards. The laboratory ensures that it uses the latest valid edition of a method unless it is not appropriate or possible to do so or unless regulatory requirements dictate specific revision use. Methods are supplemented with Standard Operating Procedures that list additional details to ensure consistent application.

Where mandated, only approved procedures are used. ESC utilizes a number of method sources to accomplish project requirements. See Section 2.1.3 for a list of method references.

5.4.2.2 When the client does not specify the method to be used or if a client selects an inappropriate or out of date method, the laboratory selects appropriate and approved methods that have been designated by the project regulatory program. The client is informed as to the method chosen and client confirmation is required.

5.4.3 Laboratory Developed Methods

5.4.3.1 Introduction of analytical methods developed by the laboratory for its own use is a planned activity and is assigned to qualified personnel equipped with adequate resources.

5.4.3.2 Plans are updated as development proceeds and effective communication is maintained with all personnel involved in the development process.

5.4.4 Non-Standard Methods

5.4.4.1 When it is necessary to employ methods not covered by approved industry standard methods, these are subject to agreement with the client and must include a clear specification of the client's requirements and the purpose of the analysis. The method developed must be validated appropriately before use.

5.4.4.2 For new analytical methods, procedures are developed prior to the analysis and contain at least the following information:

- appropriate identification
- scope
- description of the type of item to be analyzed
- parameters or quantities and ranges to be determined
- apparatus and equipment, including technical performance requirements
- reference standards and reference materials required
- environmental conditions required and any stabilization period needed
- description of the procedure, including:
  - affixing identification marks, handling, transporting, storing and preparing of items,
  - checks to be made before the work is started,
  - verifying equipment function and, where required, calibrating and/or adjusting the equipment before each use,
  - method of recording the observations and results
  - any safety measures to be observed;
- criteria and/or requirements for approval/rejection;
- data to be recorded and method of analysis and presentation;
- uncertainty or procedure for estimating uncertainty.

5.4.5 Validation of Methods – ESC SOP #030211, *Method Validation*

5.4.5.1 Validation Description

Validation is process of confirmation by examination and the provision of objective evidence that the stated requirements for a specific method/procedure are fulfilled.

5.4.5.2 Validation Summary

The laboratory validates all methods, including the following: EPA, NIOSH, OSHA, and program mandated methods, approved methods used outside their intended scope, non-standard methods and amplifications, and modifications of approved methods to confirm that the methods are fit for the intended use. The validation is as extensive as is necessary to meet the needs in the given application or field of application. The laboratory records the results obtained, the procedure used for the validation, and a statement as to whether the method is fit for the intended use.

5.4.5.3 Validation for Client Need

The range and accuracy of the values obtainable from validated methods (e.g. the uncertainty of the results, detection limit, selectivity of the method, linearity, limit of repeatability and/or reproducibility, robustness against external influences and/or cross sensitivity against interference from the matrix of the sample.) are assessed for the intended use as relevant to the clients' needs.

5.4.5.4 Limits

Descriptions of analytes, preparative and analytical methods, matrices, accuracy and precision targets, and MDLs and RLs are presented in the QAM Appendices.

Method Detection Limits (MDLs) – 40CFR, Part 136, Appendix B - SOP# 030206, *Method Detection Limits*

Detection limits are determined annually and are comparable to those established by the EPA and are not typically lower than recommended detection limits. To determine whether the EPA detection limit is being achieved, an MDL study is performed according to 40 CFR Part 136, Appendix B. The standard deviation of, at least,seven standards at or near the expected detection limit is calculated. MDLs are determined such that the risk of reporting a false positive is less than 1%. The method detection limit (MDL) is calculated as follows:

$$MDL = TS$$

where: S is the Standard Deviation of replicate measurements and
T is the value of Student's T for n-1.

If the MDL is higher than the EPA-method-suggested MDL, the calculated value is used as a basis for establishing the reporting limit (RL) for reporting. MDLs are re-calculated on an annual basis or sooner if a material change in the instrumentation or method is enacted, or a change in the calibration response factor is noted. Additional studies may also be conducted to enhance the program.

Published MDLs may be set higher than experimentally determined MDLs to: 1) avoid observed positive interferences from matrix effects or common reagent contaminants or 2) for reporting convenience (i.e., to group common compounds with similar but slightly different experimentally determined MDLs).

Reporting Limits (RLs)

Reporting Limits (RLs) are typically set 3 - 10 times the standard deviation calculated in the MDL process listed above. Because reporting level checks are required, ease of preparation of commercial analytical mixes may dictate, to some extent, the reported RL. Generally, the RL is not set at less than 3 times the MDL. The final RL is determined based on the matrix, method, and analyst experience. RLs are verified daily using a calibration standard at a level equal to or less than the established RL.

ESC – Practical Detection Limit

Where necessary, ESC uses in-house protocol to determine a practical and real number for method detection. This is not a statistically derived number. It is a verified number that is validated using a 20% coefficient of variation. Signal to noise ratios and baseline behaviors are assessed and considered for each instrument type. Instrument performance is assessed based on the lowest possible detectable concentration that is 3X above the noise level. A series of samples are prepared at the determined level, using the method protocol. The samples must perform within a 20% coefficient of variation. The lowest concentration that meets the criteria is the Practical Detection Limit. This determination either confirms or replaces the MDL as determined using 40CFR Part 136.

5.4.5.5 Demonstration of Capability

Initial and Continuing Demonstration of Capability (IDOC & CDOC)
(General Testing Other Than Environmental Lead)

NOTE: All IDOC & CDOC records are kept on file by the laboratory. Supporting data is filed with each demonstration. Completion is recorded on the form found in the NELAP Standard Appendix C. Records of verification are required for each individual and are retained for a minimum of 10 years.

General Requirements:

- A DOC is performed for each analyte whenever the method, analysts, analytes, or instrument type is changed.
- The Department Supervisor certifies that technical staff members in their area of expertise are trained and authorized to perform all analyses for which the laboratory is accredited by signing the DOC form. The QA department is the final approval of all IDOCs and CDOCs
- More specific information can be found in SOP# 030205: *Technical Training and Personnel Qualifications*

IDOC

An initial demonstration of capability (IDOC) must be made prior to using any analytical method, at any time there is a significant change in instrument or method, and when a new analyst is trained. An analyst can achieve the IDOC requirement for a specific method by using sample spike results. The following guide is a general outline of the IDOC requirements:

- A quality control sample is obtained from an outside source. If not available, the QC sample may be prepared by the laboratory using stock standards that are prepared independently from those used in instrument calibration.
- The analyte(s) is diluted in a volume of clean matrix sufficient to prepare four aliquots at the concentration specified, or if unspecified, to a concentration approximately 10 times the method stated or laboratory-calculated method detection limit.
- At least four aliquots are prepared and analyzed according to the method either concurrently or over a period of days.
- Using all of the results, calculate the mean recovery (x) in the appropriate reporting units (such as µg/L) and the standard deviations of the population sample (n-1) (in the same units) for each parameter of interest. When it is not possible to determine mean and standard deviations, such as for presence/absence values in micro and mold analyses, the laboratory must assess performance against established and documented criteria.

- Compare the information from above to the corresponding acceptance criteria for precision and accuracy in the published method. If no method criteria exist, the IDOC performance must be compared to in-house QC limits for laboratory control samples (LCS). Where appropriate, limits may be compared to the criteria listed in DOD QSM. If all parameters meet the acceptance criteria, the analysis of actual samples may begin. If any one of the parameters does not meet the acceptance criteria, the performance is unacceptable for that parameter. The analyst completes further training before attempting the IDOC process again.

CDOC

Continuing Demonstration of Capability (CDOC) are performed at least annually by documentation that technical personnel have read, understood and agreed to perform the most recent version of the analytical method (the approved method or standard operating procedure) and documentation of continued proficiency by at least one of the following once per year:

- Acceptable performance of a blind sample (single blind to the analyst);
- Another demonstration of capability using at least four consecutive laboratory control samples with acceptable levels of precision and accuracy
- Successful analysis of a blind performance study sample

Initial and Continuing Demonstration of Capability (IDOC & CDOC)
(Environmental Lead Only)

IDOC

Analysts/Technicians in training complete a minimum of four independent test runs of sample preparation and/or instrumental analysis. Independent runs are defined as analytical runs consisting of at least five known samples, one of which is a certified reference material or proficiency testing material, separated by a period of time sufficient to evaluate the testing material.

- Sample Preparation and Analytical Personnel - the recoveries of the associated reference materials or proficiency training samples for each run must be within ±10% of the certified value, 75% of the time.

NOTE: The reference/proficiency test samples utilized are: 1) similar to matrices the analyst encounters during routine sample analysis, 2) cover the sample mass range for which the analytical SOP has been designed and 3) cover the Lead (Pb) concentration for which the analytical SOP has been designed. In cases where there are several matrices of potential concern, four independent runs are not be sufficient to provide adequate demonstration of performance.

CDOC

Annual demonstrations are performed by Analysts/Technicians involved in Lead (Pb) analyses to showed continued ability to adequately analyze samples for Lead (Pb) based on standard reference materials (SRMs) or certified reference materials. This demonstration is done at a minimum of every six months and can be a part of the analysis of proficiency testing materials or quality control samples associated with routine sample runs.

5.4.6 Measurement Uncertainty - ESC SOP# 030221, *Measurement of Uncertainty*

5.4.6.1 Uncertainty Definition

Uncertainty is defined as a variable associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement type. This definition of uncertainty focuses on the range of values that is relevant to the analytical technique being utilized for the analysis of field samples.

The uncertainty of testing results are calculated and documented in accordance with the requirements of ISO 17025 Clause 5.4.6. The Estimation of Uncertainty of Measurement Procedure is applied to all in-house analytical methods, where practical. The uncertainty of measurement determination is also required of all ESC subcontractors.

5.4.6.2 Uncertainty Procedure

The Estimation of Uncertainty of Measurement Procedure is applied for estimating uncertainty of measurement, except when the analytical methods preclude such rigorous calculations. In certain cases it is not possible to undertake metrologically and statistically valid estimations of uncertainty of measurement. In these cases the laboratory attempts to identify all the components of uncertainty and make the best possible estimation, and ensure that the form of reporting does not give an exaggerated impression of accuracy. Reasonable estimation is based on knowledge of the performance of the method and on the measurement scope, and makes use of previous experience and validation data.

The degree of rigor needed in an estimation of uncertainty of measurement depends on factors such as:

- Requirements of the method
- Requirements of the client
- The existence of narrow limits on which decisions on conformance are based

In practice the uncertainty of the result may arise from many possible sources, including an incomplete definition, sampling, matrix effects and interferences, environmental conditions, uncertainties of weights and volumetric equipment, reference values, approximations and assumptions incorporated in the measurement method and procedure, and random variation.

In cases where a well-recognized method specifies limits to the values of the major sources of uncertainty of measurement and specifies the form of presentation of calculated results, the laboratory is considered to have satisfied the estimation uncertainty of measurement by following the method and reporting instructions (see section 5.10).

5.4.6.3 Uncertainty Determination

Where possible, ESC utilizes data from Laboratory Control Samples (LCS) to determine the minimal uncertainty estimates in each matrix. LCSs are matrix dependent and are consistent representatives of the method effects on the particular matrix of choice. Uncertainty is determined per analytical technique, where applicable, and is performed using a population of 50 or more data points. Since the uncertainty is essentially constant, for each method, across a given matrix, ESC's method of choice is to determine uncertainty at the 95% confidence interval.

Procedure Summary:

- Select a group of representative data, from a single matrix. Data set must be 50 individual measurements or greater.
- Determine the relative standard deviation of recovery data
- Calculate the expanded uncertainty as two times the relative standard deviation

5.4.6.4 Uncertainty Results

ESC does not report uncertainty measurements on the final report. However, uncertainty determinations are available for review, when specifically requested for a project. The measurements are only applicable to the specific analytical procedure and matrix. No effects of sampling activities or related processes are considered in this determination.

5.4.7 Control of Data

5.4.7.1 Transfer Checks

Calculations and data transfers are subject to appropriate checks in a systematic manner.

5.4.7.2 Automated Acquisition

When computers or automated equipment are used for the acquisition, processing, recording, reporting, storage or retrieval of data, the laboratory ensures that:

- computer software developed by the user is documented in sufficient detail and suitably validated as being adequate for use
- procedures are established and implemented for protecting the data; such procedures includes, but not be limited to, integrity and confidentiality of data entry or collection, data storage, data transmission and data processing
- computers and automated equipment are maintained to ensure proper functioning and are provided with the environmental and operating conditions necessary to maintain the integrity of data.

5.4.7.3 Commercial Software

Commercial "off the shelf" software, e.g., word processing, database and statistical programs in general use within its designed application range may be considered sufficiently validated. However, laboratory software configuration/modifications are validated as in 5.4.7.2.

5.4.7.4 ESC Software Systems

Table 5.4.7.4a LIMS

System	Description
LIMS	The LIMS is a computerized database for data management. Access to the system is protected by coded password and access is granted based on user need.
Security	Level 1. Login, lookup sample status, generates worksheets. General access, every station has access. Level 2. Enter data, proofread and change data. The data entry person has access to this level. Level 3. Review and validate data, generate reports. Access is limited to the TSR, lab supervisors and QA. Once data is approved in the LIMS, it cannot be altered. Only the status of the sample may be changed to either "reported" or "invoiced."
Hardcopy Records	• Login summary - includes all information on sample and requested analyses • Lab preparation preview and benchsheets for digestions, extractions • Lab assignment/benchsheets to generate work assignments and record data • Data approval reports • Final reports for clients • QA summary
Hardcopy Records	All paper records are retained by ESC. As the pages become historical (prior to the current working range of log numbers), they are removed from the logbook, prep book, or workbook in sequential order and permanently bound for storage in banker's boxes. The Lab Support Supervisor maintains a log of numbered boxes and their contents. They are cross-referenced by sample log number, date and

Table 5.4.7.4a LIMS	
System	**Description**
	storage number.
Data Records	*Data* is available on electronic media. *Revisions* to the LIMS software are documented within the code. Each revision indicates the change in function, programmer's initials, and date of change. Programming has limited access and is accessible only by approved individuals through the use of passwords.
Manual Data Entry (verified by 4-step system)	• The section supervisor first approves raw data. • The data entry portion of the LIMS can only be accessed by authorized individuals, therefore allowing limited access to protect the integrity and maintain the confidentiality of the data. • The data entry person and a qualified laboratory analyst then proofread each group of entered data. • When all results for a sample are complete, a report is printed and examined by a Technical Service Representative for final approval.
Calculations	All calculations performed by the LIMS are approved and submitted by the Laboratory Supervisors. Each calculation is tested parallel to manual calculations to ensure proper function.
Automatic Data Transfer	Data is transferred electronically from instrumentation directly to the LIMS. Once the data has been transferred, it undergoes a screen review. The data is then printed and reviewed again. If data needs to be changed, a data entry specialist changes it and a hardcopy is printed of the final data.

Table 5.4.7.4b AUXILIARY SOFTWARE	
System	**Description**
Auxiliary	Auxiliary Computer and Software Used to Generate and Validate Data
General	Several instruments have their own dedicated single computer and manufacturer-designed software to run them. Instruction manuals and other documentation provided by each manufacturer are maintained. ESC receives updates as they become available from the manufacturer. All raw and filtered data is stored on media (with uniquely titled data files on floppy discs) and all associated printouts and paperwork is filed. The original raw data is not accessed again unless it is subjected to uncertainty.
Method Files	Creation of any method or analyte files, necessary to run the appropriate analyses is the responsibility of the group leader. The lab supervisor verifies that the compounds, wavelengths, retention time windows, calculation criteria, and other relevant parameters are correctly input into the specific method file. Analysts may only use the method files that have been specifically generated by the group leader.
Supplier Info	All purchased software that is used in conjunction with software specific instruments is guaranteed by the supplier to function as required. The supplier of the software performs all troubleshooting or software upgrades and revisions.
Validation	Computer software is validated for proper performance. The result of the validation is recorded, when in-house programming is the source of the calculation.

5.5 EQUIPMENT

5.5.1 Usability

Laboratory standards, equipment, and associated apparatus are suitable for the validation of acceptable performance of analyses and are maintained in accordance with this quality manual to include protection from dirt, dust, corrosion, and other causes of deterioration. Laboratory personnel investigate any equipment or standards, which are suspect in contributing to out-of-control conditions. Records of corrective actions for discrepancies are maintained in the laboratory (see Section 4.11).

5.5.2 Calibration of Equipment

5.5.2.1 To maintain the integrity of standards, all maintenance operations are performed according to documented procedures and the laboratory standards are:

- Selected for use according to the level of precision, accuracy, and uncertainty required
- Limited in access and use, to trained and authorized laboratory staff only
- Handled and safely stored separately from samples and according to method requirements

5.5.2.2 Primary standards, directly traceable to NIST standards, are obtained from a vendor approved by the A2LA or NELAP and all certificates of analysis are maintained on file in the laboratory.

5.5.2.3 Secondary standards are also obtained from a vendor approved by the A2LA or NELAP and all certificates of analysis are maintained on file in the laboratory. They are calibrated by comparison to primary standards. Calibration reports are maintained on file in the laboratory.

5.5.2.4. Working standards are prepared from certified stock standards. Standard preparation logs are maintained electronically via the Standards Logger in the ESC LIMS.

5.5.2.5 Support Equipment Calibration: Including, but is not limited to: balances, ovens, refrigerators, freezers, incubators, water baths, temperature measuring devices, volumetric dispensing devices, and thermal/pressure sample preparation devices. All support equipment is maintained in proper working order and records are kept of all repair and maintenance activities, including service calls.

5.5.2.6 Equipment used with nominal values and corrections is verified by calibration labs having ISO 17025, or other suitable, accreditation. A calibration interval is established for the equipment (i.e., environmental equipment, balances). All balances and temperature-indicating devices are calibrated or verified by an

outside vendor two times per year. Verifications are performed on balances on each day of use.

5.5.2.7 Calibration of equipment is conducted at a frequency to ensure that the equipment remains in tolerance during its use in the laboratory. Frequency of calibration is based on a review of calibration, maintenance, and repair history. Reviews are conducted by the Department Manager and records are maintained.

5.5.3 Equipment Operation and Maintenance – See Table 5.5.3.3 for General Information

5.5.3.1 ESC's preventative maintenance program provides guidelines to ensure that every effort is made to keep equipment well maintained and prepared for the next project. Most equipment is kept in duplicate and spare parts are kept in stock. Instrument/equipment manuals are kept in each department for quick reference to aid in problem diagnosis. ESC maintains service contracts on major laboratory equipment, so that in the event of failure, repairs can be made within a few days. The appropriate Department Manager is consulted if an instrument repair is required. If a solution to the problem is not found immediately, a call may be placed to the instrument manufacturer or maintenance support provider for assistance in diagnosing the problem, determining the extent of repair needed and a possible timeframe for repairs to be completed.

5.5.3.2 If analyses are scheduled and it appears that the equipment may be down for a longer period, ESC arranges for analyses to be performed by another qualified lab. This action is utilized if client required definite turnaround time or sample holding times would be exceeded.

5.5.3.3 General Equipment (All Labs)

If method calibration requirements for a particular procedure are more stringent than those listed here, they are followed when that procedure is performed.

Table 5.5.3.3a General Equipment Calibration			
Equipment	**Activity**	**Frequency**	**Record Type**
Balances	Verified with Class I NIST traceable weights when used	Before use	Logbook – Located in each respective lab
Balances	• Clean • Check alignment • Service Contract Top-loading balances are allowed a tolerance of ±1%, while analytical balances are allowed a tolerance of ±0.1%.	Semi-annually under a service contract.	Certificates from contractor.
Weights – Class I	• Only use for the intended purpose • Use plastic forceps to handle • Keep in case • Store in desiccator • Re-calibrate	Checked for accuracy by an external source, annually, or sooner if necessary.	Certificates from contractor.
pH meters	Calibration: • pH buffer aliquot are used only once • Buffers used for calibration bracket the pH of the media, reagent, or sample analyzed. • Check must perform within 0.05 pH units. Temperature correction is performed either automatically by the instrument or manually depending upon the instrument used.	Before use	Calibrations are recorded in a logbook.
Automatic pipettes	Verify for accuracy and precision using reagent water and analytical balance	In-house – Monthly Contract – Semi Annually Tolerance is set at 2.0%, (ASTM standard = 3%).	Monthly verifications are recorded in a logbook. Semi-annual cal. is verified by certificates from the cal. service.
Refrigerators, Freezers, Hot plates and BOD incubators	• Thermometers are immersed in liquid to the appropriate immersion line • The thermometers are graduated in increments of 1°C or less • Temperature ranges are listed in appropriate SOPs	Temperatures are recorded each day in use	Logbook
Ovens	• Thermometers are immersed in sand to provide even measurement • The thermometers are graduated in increments of 1°C or less	Temperatures are recorded each day in use	Logbook

Table 5.5.3.3a General Equipment Calibration			
Equipment	**Activity**	**Frequency**	**Record Type**
Thermometers	ESC NIST-certified thermometers All working thermometers	Calibrated annually by a NIST calibration service, accredited to ISO/IEC 17025 and ANSI/NCSL Z540-1. Verified semi-annually against NIST-certified thermometers by an outside	Calibration certificates from the calibration service. "Accuracy Assurance Program Test Data Sheets" provided by the servicer. All thermometers are tagged with current tolerances. Internal daily
DO Meter	Calibrated according to manufacturer's specifications. Using the recorded temperature and barometric pressure the meter is calibrated to the air saturation of dissolved oxygen using a conversion chart provided by the manufacturer.	Before use	Calibration of each meter is recorded in a separate logbook.
Specific Conductivity Meter	The conductivity meter is calibrated according to manufacturer's specifications. Temperature correction is performed either automatically by the instrument or manually depending upon the instrument used. • Biomonitoring, potassium chloride with a conductivity value of 100 and 1000 µmhos /cm is used as the calibration standard. • Wet Lab, potassium chloride with a value of 1413 µmhos/cm is purchased from NSI for calibration purposes.	Before use	Calibration of each meter is recorded in separate daily logbooks.
Fume Hoods	Check semi-annually and must meet the OSHA minimum recommended face velocity of 60 – 100 fpm.	Semi-annually	Recorded in Logbook

Table 5.5.3.3b Class 1 Weight Tolerance				
Value	**ASTM Class 1 Tolerance**	**Unit**	**ASTM Class 1 Tolerance**	**Unit**
1mg	0.01	mg	0.00001	g
2mg	0.01	mg	0.00001	g
3mg	0.01	mg	0.00001	g
5mg	0.01	mg	0.00001	g
10mg	0.01	mg	0.00001	g
20mg	0.01	mg	0.00001	g
30mg	0.01	mg	0.00001	g
50mg	0.01	mg	0.00001	g
100mg	0.01	mg	0.00001	g
200mg	0.01	mg	0.00001	g
300mg	0.01	mg	0.00001	g
500mg	0.01	mg	0.00001	g
1g	0.034	mg	0.000034	g
2g	0.034	mg	0.000034	g
3g	0.034	mg	0.000034	g
5g	0.034	mg	0.000034	g
10g	0.05	mg	0.00005	g
20g	0.074	mg	0.000074	g
30g	0.074	mg	0.000074	g

5.5.4 Identification of Equipment

Each item of equipment is uniquely labeled, marked or otherwise identified. Maintenance and calibration records for equipment and standards are maintained.

5.5.5 Records of Equipment

Equipment lists are department specific and are found in the associated appendices to the QA Manual.

5.5.6 Equipment Handling, Storage, Use, and Maintenance

All laboratory equipment is maintained, stored, and used in accordance with manufacturer's instructions. Operation manuals and instructions for proper maintenance of equipment are available to the staff and located in the laboratory.

Equipment is used or operated only when in a safe and reliable condition, by personnel who have been trained and are qualified. User instructions are available.

Table 5.5.6 - GENERAL PREVENTATIVE MAINTENANCE	
Type	***Description***
Glassware	Routine laboratory glassware is washed in a non-phosphate detergent and warm tap water. Before washing, all writing and large deposits of grease are removed with acetone. Glassware is then rinsed with: tap water, "No Chromix" solution, tap water, and deionized (DI) water. Glassware is stored in designated drawers or on shelves, inverted if possible. All organic glassware is rinsed with the required solvent, prior to use. Inorganic glassware is rinsed with DI water prior to use, which is a precaution against airborne cont.
Logbooks	Maintenance logs are kept on all major laboratory equipment. The logbook is updated and signed when maintenance is performed (i.e., new rings, column or septum change, etc.). Maintenance logbooks are located in the immediate area of the instrument. All preventive maintenance is noted either in the maintenance logbook or in the runlog notebook. At a minimum, all maintenance logs contain the following: • All entries in the maintenance logs must be initialed and dated by the person performing the maintenance. • All maintenance logs must be bound and paginated. • All pages of the maintenance logs must have “ESC” at the top of page. • The instrument ID number or serial number. • Make and model of the instrument. • Date of installation or the date the instrument was put in service (if available). • Condition of the instrument when installed (new or used) • A unique number for each notebook
Service Records	Maintenance that requires a service call from the vendor should contain the following: • Must state details when the problem began, and what the problem was. • When a service call was placed. • When the service engineer came to repair the instrument. • When the problem was solved. • How the problem was solved. To verify that the instrument is running properly after service has been performed, recalibrate and analyze QC samples before the service engineer leaves.
Additional Records – Misc. Monitoring	Additional records are kept, updated and signed when technicians are assigned to perform the following tasks: • Monitor laboratory devices such as air compressors, vacuum pumps, heaters, etc., to ensure that they are properly lubricated and in good working condition. • Monitor on a daily basis: general lab QC areas, such as BOD incubators, temperature, drying ovens, desiccators, deionized water, sample cooler temperature, etc., and record appropriate parameters in the assigned QC logbooks. • Monitor the supply and quality of purchased chemicals, reagents and glassware, and keep inventory at established levels. All chemicals are dated in relation to receipt and date opened.

5.5.7 Equipment Out of Service

When equipment is found to be in unacceptable condition or has been subjected to overloading or mishandling or if an instrument gives suspect results or has been shown by verification or otherwise to be defective, the equipment is clearly marked as out-of-service. Only the analyst responsible for the repair, or the Department Manager, can place equipment back in service. Once repaired and validated by calibration, verification, or other appropriate reviews, and found to perform satisfactorily, the equipment can be placed back in service. The laboratory examines the possible effect of defective equipment on any previous calibrations.

5.5.8 Status of Calibration

When appropriate, each item of equipment is labeled, marked, or otherwise identified to indicate its calibration status.

All equipment used with nominal values and corrections is labeled indicating the calibration status. Examples of this equipment include thermometers, calibration weights, and balances.

5.5.9 Equipment Returning to Service

When for any reason, equipment goes outside the direct control of the laboratory, the laboratory ensures that the function and calibration status of the equipment are checked and shown to be satisfactory before the equipment is returned to service.

5.5.10 Calibration Checks

Analytical instruments are calibrated per method requirements. Calibration and calibration check requirements are described in the appendices of this document for each analytical area. Balances and temperature-indicating devices are verified semiannually. Records are maintained as quality assurance documents.

5.5.11 Calibration Factors

Where calibrations give rise to a set of correction factors, the laboratory has procedures to ensure that copies (e.g., in computer software) are correctly updated.

5.5.12 Safeguarding of Equipment Integrity

Analytical and supporting equipment is protected from inadvertent adjustments that could affect the integrity of the laboratory results. Instruments are located in access-protected areas. Software is tested and approved before use.

Spreadsheets used in the calculation of analytical results are tested, approved, and locked before being placed into service.

5.6 MEASUREMENT TRACEABILITY

5.6.1 Policy (See SOP# 030202, *Receipt and Records of Stock, Intermediate, and Working Standards)*

5.6.1.1 Standards and equipment significantly affecting the measurement integrity of analyses conducted by the laboratory are monitored for stability as part of the measurement control program. Standards and equipment are calibrated and/or verified before use to ensure acceptable performance. Any standard or equipment that appears unreliable or has exceeded the calibration interval is evaluated and/or removed from service.

5.6.1.2 When standards, reagents, or other certified consumables are received, they are assigned a unique number. The number is recorded in the LIMS Standards Logger with other important information concerning receipt date, supplier, expiration date, description, and volume. The number is then placed on the item and the Certificate of Analysis. The Certificate of Analysis is maintained electronically. Each item is dated upon opening. Each laboratory appendix contains a list of standard sources, receipt, and preparation information. Field personnel obtain several field standards from the lab and the standards are NIST traceable.

5.6.2 Measurement Traceability

5.6.2.1 ESC has established a program of calibration and verification that is designed to ensure that the measurements made by the laboratory are documented and traceable to national standards.

5.6.2.2 To provide external evidence of traceability, the laboratory participates in measurement control programs, such as proficiency tests, and other interlaboratory and collaborative round robins, as required (See SOP# 030212, *PT Program*).

5.6.3 Calibration/Verification

5.6.3.1 Standards (Calibration)

5.6.3.1.1 Primary standards are calibrated to the standards set forth by the National Institute of Standards and Technology (NIST) or by an ISO 17025-accredited provider.

5.6.3.1.2 Primary standards are verified by secondary standards and are monitored through the measurement control programs established in the laboratory.

5.6.3.1.3 Standards are re-calibrated if there is damage to the standards or any significant change is observed in the measurement control program.

5.6.3.2 Standards (Verification)

5.6.3.2.1 Continuous verification of standards, through the measurement control program, ensures required measurement integrity of testing and includes:

- Statistical data from check standards and/or control charts (See SOP# 030207, *Quality Control Charting and Tracking)*
- Results from interlaboratory comparisons and/or proficiency tests (See SOP# 030212, *PT Program*).

5.6.3.2.2 Measurement assurance procedures for verification of standards are maintained in the laboratory, according to the individual method SOPs.

5.6.3.3 Measuring and Test Equipment

5.6.3.3.1 Equipment used with nominal values and corrections is calibrated by calibration labs having ISO 17025 accreditation, other suitable accreditation, or mutual recognition. A calibration interval is established for the equipment.

5.6.3.4 Standard/Reagent Sources, Records, & Preparation

Standard /Reagent Selection

Standards and reagents are selected according to the method requirements. A minimum of analytical reagent grade is used when not method stated. The Laboratory Director or designee(s) makes the actual determination concerning quality and manufacturer. The purchasing agent maintains a list of approved vendors that have been evaluated and approved as suppliers of critical consumables, supplies and services that may affect the quality of environmental testing and calibration. All supplies that are directly used for analysis are inspected and verified upon arrival at the Laboratory. ESC SOP# 030210, *Materials Procurement for Analytical Processes,* details the entire procedure.

Standard/Reagent Inventory

An inventory of consumables and reagents are stocked in the individual laboratory areas. Any overstock items are kept in a controlled area, maintained by the purchasing department. Items are taken from the inventory area to the laboratories upon request.

Standard/Reagent Preparation

When standards are prepared in-house, they are weighed on an analytical balance, calibrated against Class “I” weights, diluted in Class "A" glassware, and compared against an external reference standard. The standard is marked with concentration, then signed and dated by the analyst, and placed in the appropriate storage area.

All dilutions of stock standards are prepared in Class A volumetric glassware. Where dilutions are made to volume, TC (to contain) glassware is used. All volumetric pipettes are Class A and designated as TD (to deliver). If the intermediate or working standards are to be saved and used again, the standard container is marked with concentration, date, source standard, expiration, and the analyst's initials.

All purchased stock standards are kept in a designated area within the appropriate section. Each chemical is marked in relation to date received, date opened, and expiration date.

Standard/Reagent Logbooks

A standard log is kept with each analysis book, indicating date of preparation, which standard (by lot number, if applicable) used, the amount used to prepare the solution, when it was made and expiration date or the recommended holding time. Reagents are recorded in the same manner as standards. Reagents that are prepared on a daily basis are recorded directly onto the raw data sheet. The analyst preparing the reagent initials and dates the raw data sheet. Where appropriate, an electronic LIMS Standard Logger is used in lieu of handwritten logbooks.

5.7 SAMPLING

5.7.1 Sampling Plan

When the laboratory carries out sampling of substances, materials or products for subsequent testing or calibration, it has a sampling plan and procedure for sampling. The sampling plan as well as the sampling procedure are available at the location where sampling is undertaken. Sampling plans are, whenever reasonable, based on appropriate governing methods. The sampling process addresses the factors to be controlled to ensure the validity of the analytical results.

5.7.2 Client Requirements

ESC has no jurisdiction over client deviations from any sampling plan but clients are encouraged to maintain proper records and to include appropriate information in all documents and communications.

5.7.3 Sampling Records

See Appendix III for information regarding the records of relevant field data.

5.7.4 Field Sampling - General Summary

Sample Labels

All sample labels contain the following information: Client name, project name or ID, site ID, sampling point, time collected, and date collected. In addition the label includes information regarding preservation and method assignment. The project ID number is a unique ID number that can be associated with the client overseeing the project. Clients are designated in the ESC LIMS by a unique name referred to as a COCODE. The COCODE always precedes the project ID so that ESC personnel can easily relate a project ID to a particular client. As samples are logged in, they are assigned a unique sequential number. NO login number can be used twice. When the samples are logged in, all field label information is entered. All sample information can be accessed by entering the LIMS and viewing the sample login number. ESC has the capability to access all samples with the same project ID and print a summary of the samples. All field information can be reviewed in the field notebook by date and client.

Field Notebooks

Field notebooks are an essential part of the COC. Every detail concerning the sampling event must be documented. All documentation must be written with waterproof ink. All records are signed and dated by the individuals responsible for making the entry. Errors made during the documentation process are deleted by a single line with the initials of the person who corrected it and the date made.

Crucial information to be recorded in the field notebook includes:

- Site identification
- Sample location
- Date and time of sample collection.
- Names of individual(s) collecting and documenting each sample.
- Names of all individuals present at the time of collection.
- Pertinent field conditions, including weather, site, traffic, other events, problems, etc.
- A copy of the Shipping Batch Detail Report is included as an attachment to the COC with each kit prepared and shipped.
- Specific sampling equipment used for the collection of each individual sample or sample group (Unique equipment identification numbers can be used.)

- If field analyses are performed, calibrations and results are recorded in field workbooks.
- When sampling monitoring wells, the field notes (whether in notebooks or on standard forms) must also document:
  - *Well casing composition and diameter*
  - *Water table depth*
  - *Well depth*
  - *Calculations to determine the volume of water to be purged*
  - *The total volume of water purged and how accomplished*
  - *The date and time well was purged, beginning to end*
  - *Use of fuel-powered units, bailers, etc.*
- When collecting surface water samples, the field notes must include the depth at which the sample was taken and the type of sampling equipment used.
- When water samples are collected over a period of time, it is necessary to indicate the following information in the field notes:
  - Collection beginning and ending time and date
  - Specific equipment used (manual or automatic)
  - Abnormal conditions of the sampling location
  - Safety precautions taken.

Field Chain of Custody (COC)

All field records include the signature of the person(s) responsible for the collection of the samples.

COC forms are completed and returned with the samples collected by ESC personnel. COC forms are also made available to clients collecting their own samples. A copy of the COC is retained in pdf form along with a pdf copy of the final report in the LIMS. The original is returned to the client with the final report. The COC is signed by the sampling personnel in the space referred to as "Collected by:".

A sample label is affixed to the side of each sample container before or at the time of sample collection. Pertinent information on the label includes a unique field identification number, sample description, preservative, method requested, date and time the sample was collected.

5.7.5 Field Quality Control Checks

Blanks collected in the field are considered to be specific quality control for a set of samples. Analytical data that is consequential from the blanks is used to assess the integrity of field sampling and cleaning operations. This data can be used to confirm the use of contaminant-free sample containers and preservation reagents, and/or successful equipment cleaning. Potential on-site contamination, personnel sample collection technique accuracy, and problems that may occur in sample storage and transportation may also be revealed. Field blanks are treated in the same manner as regular samples: preserved with the same reagents, stored and transported in the same containers with samples, etc. For soil or solid samples, deionized water is used for blanks in similar containers.

5.7.5.1 Field/Equipment Blanks

The purpose of field blanks is to evaluate the purity of preservation or additive reagents. Field blanks also represent the collection techniques, general sample containers to be filled, and the effects of on-site environmental conditions and possible contaminants. Field blanks are prepared at sampling locations by filling sample containers with DI water, adding appropriate preservatives or additives, sealing the containers, and completing all paperwork required for the samples. Field blanks are stored in the same shipping containers with the samples for transportation back to the lab.

Field blanks are generally collected at a rate of one blank per parameter group per day, or 5% of the samples in the parameter group, whichever is greater.

Equipment blanks help measure the effectiveness of pre-cleaning and field cleaning of equipment. They are used to evaluate sources of contamination that may also be found in a trip blank. Equipment blanks are collected according to the frequency shown in Table 5.7.5. Equipment blanks are prepared by rinsing the equipment with analyte-free water in the same manner as used for sample collection. The equipment blank is placed in the appropriate containers with required preservatives, if any. Blanks must be taken and preserved, where required, for each method group. The blanks are stored in the same shipping containers as samples for transportation back to the lab.

5.7.5.2 Trip Blanks

Trip blanks are used when sampling for volatile organic compounds to evaluate the cleanliness of the sample container, purity of the blank source water, and the exposure of the sample to contaminants during storage and/or transportation to and from the laboratory. The Laboratory supplies the trip blank with the sampling kit order, according to the following:

- The trip blanks are filled with analyte-free water plus any appropriate preservatives. (Matrix specific trip blanks are provided where necessary)
- The containers are sealed, labeled, and transported to the field in the same coolers or boxes with the sample containers to be used for sample collection.
- Trip blanks are not opened in the field.
- The trip blanks must be handled in the same manner as the samples being collected and are transferred (if required) with other samples for storage and transportation to the laboratory.
- If additional blanks (field and equipment) are necessary the same source water as the trip blanks are used.
- One trip blank per parameter group per cooler are used in the sampling event.
- The client is notified if the trip blank does not return with the sample set and a nonconformance is issued.

TABLE 5.7.5.2 EQUIPMENT BLANK COLLECTION PROCEDURE FOR EACH TYPE OF SAMPLING EQUIPMENT

No. of Samples	Precleaned Equipment Blank Per Parameter Group Prior to Sample Collection	Field-Cleaned Equipment Blanks Per Parameter Group
Less than 10	1 equipment blank if no field cleaning on site; OR	1 equipment blank for field-cleaned equipment
Greater than 10	1, or 5% of equipment sets, whichever is greater	1, or 5% of equipment sets cleaned, whichever is greater

NOTE: Equipment blanks must accompany samples in the same container used for transportation.

5.7.5.3 Field Duplicates

Field duplicates are collected for each analyte group and are required whenever five or more samples are being collected. If more than ten samples are to be collected, the field duplication rate is 10%.

5.7.5.4 Field QC Check Samples

All field instruments are calibrated at the beginning of each sampling day. Calibration is checked following every 10 samples or at maximum intervals of 4 hours. Calibration is verified at the end of the day. Recalibration is required if the QC check samples do not meet calibration criteria. The pH meter is evaluated after every ten samples using a buffer different than the ones used to calibrate the meter. The conductivity meter is evaluated by measuring the performance of the standard and the result must not vary by more than 5% from the true value after applying the cell constant.

5.7.5.5 Field Duplicate Analysis

All analyses run in the field have duplicates performed at a rate of 10% of the total samples.

5.8 SAMPLE MANAGEMENT

5.8.1 Sample Management Instructions

Clients supply environmental samples from various sources/programs for analysis. ESC utilizes method SOPs and contract requirements as the instructions to properly handle and process these samples.

5.8.1.1 Holding Time Verification

- The Login Technicians are trained to recognize analyses with immediate, 24-hour, and 48-hour holding times. When short-hold samples arrive at the laboratory, the Login procedure for those samples takes place immediately. All analysts are trained to assess incoming samples for holding time limitations.
- If a sample has a holding time limitation, the LIMS issues a due date on the bench sheet to ensure that the extraction or analysis is completed within time allowed.
- In the event that a holding time is exceeded, the TSR contacts the client, informs them of the situation, and requests further direction. If instructed by the client to proceed with the analysis, a qualifier is added to the benchsheet, which is then carried on to reporting. The final report bears the explanation in the form of a qualifier.

5.8.1.2 Sample container and Sub-Sampling

- Each container displays the following information once it has been released from sample login to the laboratory: the original sample container label and the sample login label showing the sample log number.
- If the sample requires special DOT labeling, the label remains with the sample through receiving and disposal. If the sampling personnel note any special handling or precautions due to the nature of the sample, it is recorded on the sample label. The login person, at that time, makes a note in the LIMS to ensure that all departments have the information.
- The importance of sample label review is stressed to all chemists/analysts and sample handling personnel.
- When a sample is obtained for analysis the chemist records in the appropriate prep book or benchsheet the log number, the date removed, his initials, and the volume or mass of sample removed.
- Samples are mixed prior to taking sub-samples for analysis, with the exception of VOC analyses. Sub-sampling within the laboratory is performed according to SOP# 030220, *Sample Homogenization and Sub-Sampling.*

5.8.1.3 Sample Preparation

The LIMS keeps track of samples and their corresponding log numbers to be analyzed. The analysts responsible for sample preparation maintain preparatory documentation, whether organic or inorganic. The analyst asks the LIMS to generate a prep sheet for a specific prep code. The LIMS provides all samples assigned to that prep code and prints a worksheet to record the required information.

- ESC currently maintains the following prep information: wet chemistry, metal digestions, organic extractions (by method), and GC and GC/MS injection logs.
- The chemist preparing the samples, dates and initials the entry, records any non-standard procedure (e.g., an aliquot for metal digestion other than 100mL for a water sample) or unusual observation, and which samples are spiked or duplicated.
- The organic extraction prep book contains all details concerning the sample extraction procedure.
- When a preparation is complete, the chemist assigned to perform the analysis is notified and the prepped sample is placed in the appropriate holding area.
- Each extract/digestate/distillate is labeled to provide the following information: date prepped, amount prepared (volume/weight), dilutions, etc.

- The various prep books, workbooks, and injection logs document every manipulation of the sample through receipt, preparation, and analysis.

5.8.1.4 Analysis & Analysts

- Each chemist has been assigned primary analytical procedures.
- Before beginning analysis they request a Laboratory Run Preview sheet from the LIMS and receive a printed page for the specific analysis in the form of a benchsheet. This Run Preview sheet lists all sample log numbers, sample type, and due dates relating to the samples that are ready for analysis. At that time the analyst can then select "all" or choose certain samples. Once the samples have been selected they are assigned to a unique run number and are then printed to a run benchsheet.
- The benchsheet provides all necessary information to complete the analysis such as: date and initials, flask numbers (where applicable), standards ID, instrument readings, response factors, aliquots, dilutions, final results, and all QC spike and duplicate information.
- When all data is recorded and the calculations are complete, a second chemist, a QC Specialist, performs a second analytical review. If all calculations and other performance objectives pass method criteria, the second reviewer dates and initials the data and then releases the data for final reporting.
- For data that cannot be transferred electronically, a Data Entry Specialist enters the results into the LIMS. The entered results are reviewed for transcription errors against the original worksheet by a chemist. If the lab supervisor or senior chemist rejects the work, he discusses the corrective action measures with the analyst.

5.8.1.5 Laboratory Documentation

- Laboratory notebooks and related documentation are an essential part of the analytical procedure. Every detail concerning the sample analysis must be documented.
- All documentation must be written with permanent/waterproof ink. All records are signed and dated by the individuals responsible for making the entry.
- Errors made during the documentation process are deleted by a single line, with the date and initials of the person making the change. The correct result is clearly recorded adjacent to the incorrect result.

5.8.1.6 Sample Storage and Transportation

- When a Chemist completes the preparation or analysis of a sample, he returns the sample container to the Sample Custodian.
- Samples transported under the responsibility of the laboratory are done so safely and according to storage conditions.

- Specific safety operations are addressed outside of this document.

5.8.1.7 Final Reporting

- When all analyses on a sample number have been completed, the LIMS prints the final report.
- The TSR reviews the final report for discrepancies. If discrepancies are found, re-analysis may be requested.
- The TSR gives the final approval on the report and indicates approval by signature.
- Routinely, data reports are transmitted to the client through email as a PDF file. Reports are sent as PDFs to prevent alteration of the document. The hardcopy report can be mailed to the client, when necessary. Reports may also be sent to the client by fax, or via secure access through the ESC website.
- Reports that are sent electronically are protected using the latest technology available to protect the confidentiality of the results and the client.

5.8.1.8 Sample Retention and Disposal

- Samples and related extracts/digestates are retained for 45 days.
- Non-hazardous samples containing preservative are neutralized and disposed through the conventional municipal waste system.
- Non-hazardous solids are heated at 400 degrees Fahrenheit for two minutes and disposed of in a commercial waste container.
- All other waste is disposed of according to Section 6.

5.8.1.9 Sample Subcontracting

- When samples are transferred to subcontracted facility, a COC accompanies the samples. The COC contains the following required information: collection date and time, ESC login ID number, quantity and type of container, date of sample collection, and the requested analysis.
- A copy of the COC and the sub-contract lab report is filed for permanent record.
- A subcontracted analysis log records date sent, where sent, log number, analysis requested, price, date report received, and date invoice received.

5.8.2 Sample Information and Labeling

A unique sample identification number is generated for each sample and is used throughout the analytical and disposal cycle. A record of all client-supplied samples is established and maintained. The samples are stored according to published method requirements and determinative SOP.. While in storage, the client samples are stored by sample ID and analyses required.

- When samples are logged in, the information entered into the LIMS includes sample description, date and time collected, collector ID, field ID, project ID, date and time received, receiver's ID, analysis requested, specific QC requirements, type of container and preservative, sample type, due date, and remarks.
- Each sample is assigned a unique and consecutive log number. After a sample is entered into the LIMS database and assigned a specific number identifier, the LIMS login screen automatically presents the next consecutive number for logging in the subsequent sample. Log numbers are not available for reuse and cannot be altered, although descriptive information, as well as sample specific comments can be modified until the final report is issued.
- A sample label with the log number is printed by the LIMS and affixed to the sample. Each label contains a unique container ID, represents the sample ID number, and is clearly marked with preservative and requested analysis.
- Duplicate samples, collected in the field, are logged with a separate laboratory ID. Laboratory personnel are typically unaware of field duplication.
- Replicate samples with multiple analyses and containers have the same login ID number.
- The login person records the sample numbers assigned onto the COC. The LIMS provides documentation on the person authorized to enter sample log information.

5.8.3 Sample Inspection and Receipt

Any sample supplied by the client is verified upon receipt as meeting its description and being free from damage. In the event of a client sample being lost, damaged or otherwise unsuitable for use, full details of the incident are recorded and reported to the client by the Technical Service Representative via a nonconformance form, prior to any analytical action being taken. Any further action taken is at the direction of the client.

The Login Technician is responsible for sample login and assessing sample container integrity, documentation, and identification. Samples are inspected and noted for temperature, pH using narrow-range pH paper, headspace, proper container type, container integrity (broken or leaking), and volume levels. Samples requiring preservation at 4°C must arrive at the laboratory above freezing but ≤6°C. If the samples are not appropriately preserved, the problem is noted on a sample nonconformance form, the sampler is notified, and, if the lab is instructed to proceed, proper preservation is performed. The sample nonconformance sheet becomes a permanent part of the COC. Samples, which require refrigeration, are placed in a laboratory cooler immediately after login. If extractions are necessary, the laboratory supervisor is notified, via daily management reports, to ensure that holding times are not exceeded for samples, extracts, or digestates.

5.8.3.1 Sample Objectives

ESC receives samples for analysis for a variety of reasons, such as planning, estimating, process control, treatability as well as permit compliance reporting, site investigation, and remediation. When general screening is the goal of the client/project, analysis of improperly preserved or collected samples may proceed provided that the client is notified. In this instance, the chemist is notified and the proper documentation is placed onto the final report.

5.8.3.2 Sample Rejection Criteria

Where the analytical results are to be used for regulatory or compliance purposes, samples are rejected under the following conditions:

- If there is insufficient sample volume
- If the preservation and container requirements were not followed correctly
- If there is headspace in a sample collected for volatiles analysis
- If the COC is missing, incomplete, or filled out in pencil
- If the holding time for the desired analysis has expired
- If the integrity of the sample container or custody seal has been violated, if samples are broken or leaking, or if apparent contamination has occurred.
- If the temperature is outside of the method stated requirement
- If the samples are known to contain high levels of chemicals that present a health/safety risk (i.e. dioxins, radioactivity above background, etc.)

5.8.3.3 Nonconformance Issues

- If there are problems with the samples, the event details are documented on the sample nonconformance form/COC; then, the sampler and/or client is notified.
- If the client insists on proceeding with analyses, even though he has full knowledge of the possible invalidity of the sample, a qualifier detailing the problem is added in the LIMS and it is also noted on the nonconformance form.
- The TSR, affected chemists, and reporting personnel are also notified.

5.8.3.4 Login Confirmation

- On a daily basis, login confirmations are printed and auto-emailed to the client. A pdf copy is maintained in the ESC LIMS.
- A dual check is performed by Login and the Technical Service Group to insure proper analytical login from the COC.
- The original COC is forwarded to the reporting personnel to be reviewed and included with the final report.

5.8.4 Sample Storage and Handling

Client samples remain in their original packaging until analysis. Any samples that need to be dispensed or removed from their original packaging are stored in conditions that provide the same degree of protection.

Sample/Extract Storage:

- Samples, extracts, distillates and digestates have specific storage locations arranged in log number order unless rush analysis is required.
- Access to these areas is limited to authorized personnel.
- Samples are stored either in the cooler or in ambient-temperature storage, according to method preservation requirements

- Extracts, digestates, and standards are stored separately from calibration and other QC Standards in dedicated areas as follows:
  - Organic extractions for pesticides and PCBs are stored in glass vials in a designated refrigerator in the SVOC GC lab.
  - Organic extractions for SVOCs are stored in glass vials in a designated refrigerator in the semivolatile GC/MS lab.
  - TCLP extracts for metals only and metal digestates are stored in the metals lab.
  - TCLP extracts for SVOCs, pesticide, and herbicide analysis are stored on designated sample shelves in the cooler. After the extraction, the extract is stored in a designated refrigerator in the semivolatile GC/MS lab.
  - Zero headspace extracts and samples for volatiles are stored in VOC vials and segregated in a designated cooler. Where necessary, samples collected by Method 5035 are frozen.
  - Volatile standards are stored in a designated freezer in the VOC lab.
  - Pesticide and PCB standards are stored in a designated refrigerator in the SVOC GC lab.
  - SVOC standards are stored in a designated freezer in the SVOC GC/MS lab.

5.8.5 Special Requirements

The following entities mandate any required needs for special handling, storage, packaging, preservation, shipping, and marking provisions:

- EPA Approved Methods
- 40CFR Part 136.3
- 29 CFR (OSHA)
- 49 CFR (DOT)
- IATA (Dangerous Goods)

5.8.6 Sample Transportation

When a sample is received by the laboratory, the method of transportation is recorded on the COC. ESC routinely uses FED-EX, UPS, USPS, Velocity Express and various air carriers. Locally collected samples are sometimes carried in by the client collection personnel or by ESC courier. When ESC is involved in the actual sample collection, the samples are packed with ice on site and transported by ESC field personnel utilizing proper COC protocol.

5.8.7 Sample Custody

Chain of Custody

An important part of any sampling/analytical plan is ensuring sample integrity from collection to data reporting. Figure 5.8.7a is a flow diagram that represents the sample custody process. All records and documentation required to track a sample from point of origin through disposal must be available. The documentation of the life of the sample is referred to as "chain of custody." Formal chain of custody (COC) starts when the sample containers are requested. Such documentation includes container/shipping sheets, COC forms, field notebooks, field sample labels and custody seals, laboratory sample log sheets, sample extraction and digestion prep books, analytical workbooks and instrument logs, QC data associated with the sample set, and the final report. Examples of these documents are presented in Figures 5.8.7b through 5.8.7k.

Legal Chain of Custody

Legal COC involves all of the above, but actually begins in the laboratory with container preparation. All sample containers for collection purposes are purchased from the vender as certified clean per EPA protocols. When a kit is prepared for delivery to the field a Shipping Batch Detail Report is filled out stating the number and type of bottles, required preservatives, date prepared, date sent, and person preparing kit. A copy of the Shipping Batch Detail Report is generally kept beyond the estimated time of receipt of the kit back into the laboratory. The Shipping Batch Detail Report is sent with the kit for sampling guidance. The COC/Shipping BDR also represents the number of bottles sent to the client and the person preparing the kit. The containers are sent to the field in a portable cooler that is sealed with the COC/Shipping BDR inside by the person involved with preparation and remains sealed until the recipient opens the kit. The individual receiving the containers for field use, signs the COC at the time the kit and containers are released for shipment to the laboratory. COC forms and sample container labels identify the analyses, dates, times, and individuals who remove samples.

The COC represents all persons who have the sample in their custody at a given time. The client designates common carriers on the COC when the sample is shipped back to the laboratory.

FIGURE 5.8.7a
CHAIN OF CUSTODY PROCESS

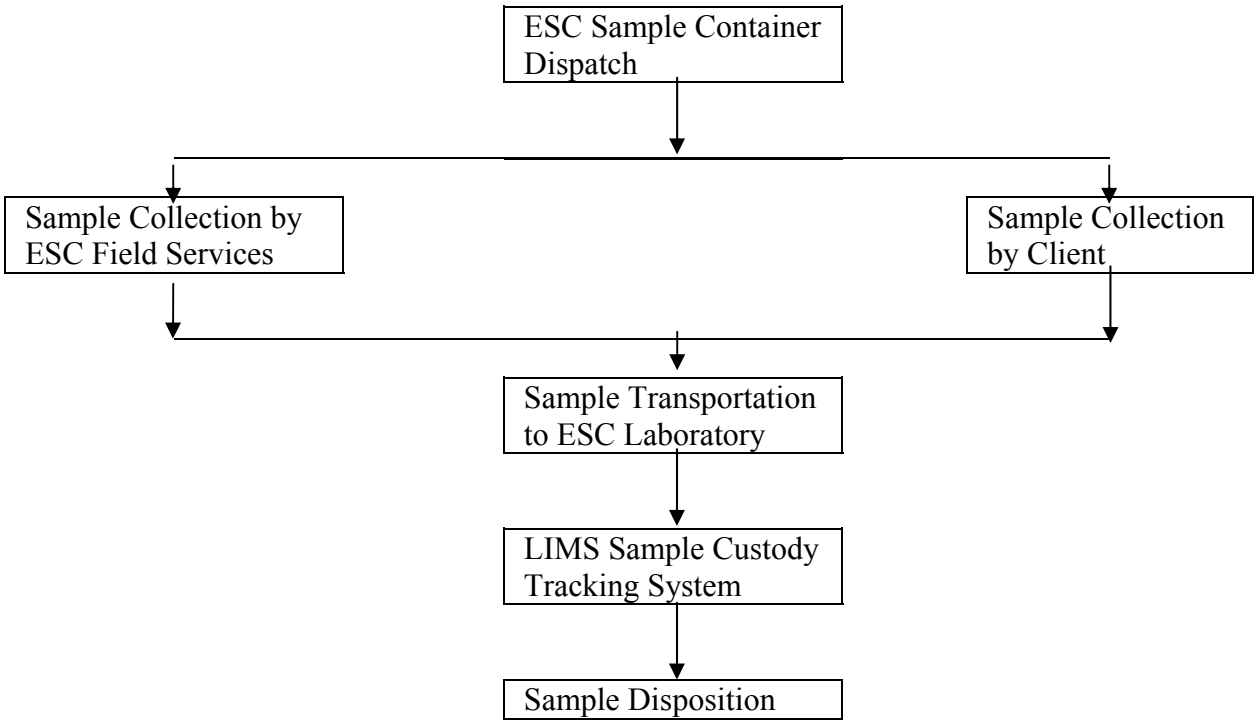
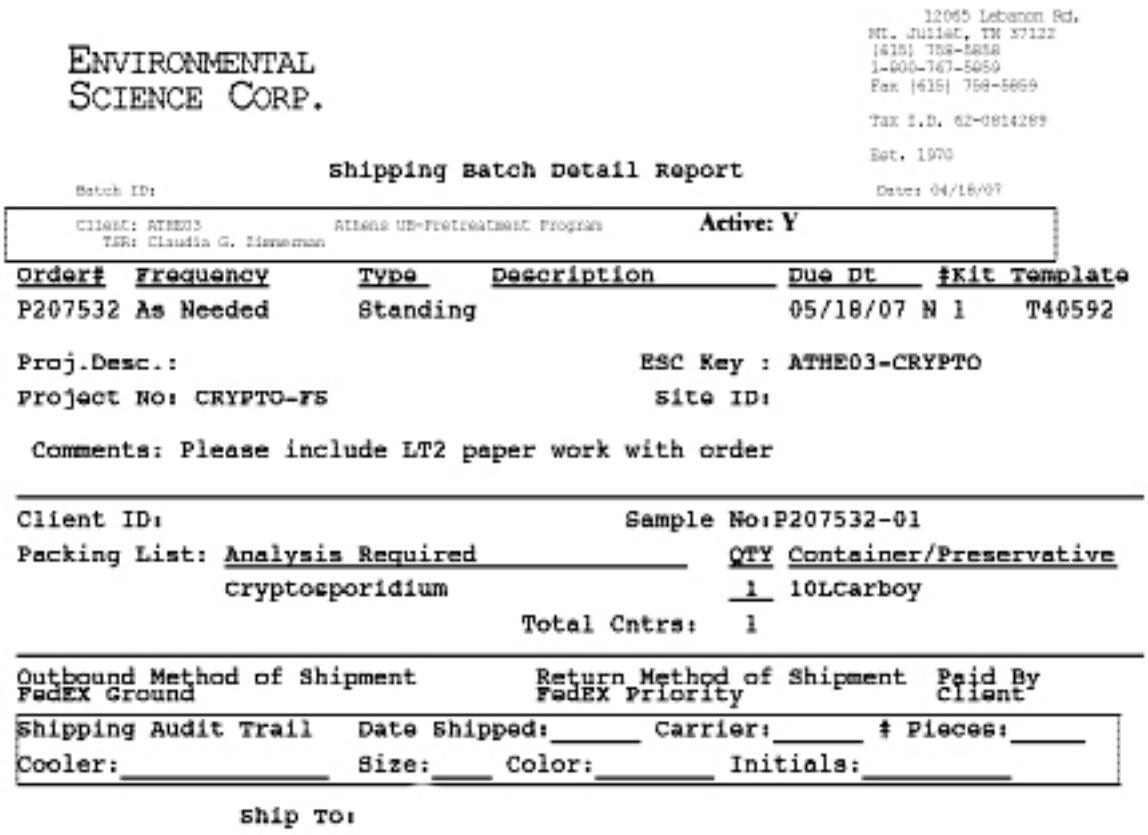


FIGURE 5.8.7b
INDIVIDUAL CONTAINER LOG
EXAMPLE
(Contents varies depending on client kit requirements)



ENVIRONMENTAL SCIENCE CORP.

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

Shipping Batch Detail Report

Batch ID:

Date: 04/18/07

Client: ATHE03 Athens UB-Pretreatment Program **Active: Y**
TSR: Claudia G. Zimmerman

Order#	Frequency	Type	Description	Due Dt	#Kit	Template
P207532	As Needed	Standing		05/18/07	N 1	T40592

Proj.Desc.: ESC Key : ATHE03-CRYPTO
Project No: CRYPTO-FS Site ID:

Comments: Please include LT2 paper work with order

Client ID: Sample No:P207532-01

Packing List:	Analysis Required	QTY	Container/Preservative
	Cryptosporidium	1	10LCarboy
	Total Cntrs:	1	

Outbound Method of Shipment	Return Method of Shipment	Paid By
FedEX Ground	FedEX Priority	Client

Shipping Audit Trail Date Shipped:_____ Carrier:_____ # Pieces:_____
Cooler:_____ Size:____ Color:_____ Initials:_____

Ship To:

Page 1 of 1

FIGURE 5.8.7c
CHAIN OF CUSTODY
GENERAL EXAMPLE
(Required Analysis is printed by ESC or Client)

Emerald Manufacturing
12065 Lebanon Road
Mount Juliet,TN 37122

Alternate billing information:

Analysis/Container/Preservative

Chain of Custody
Page ___ of ___

Prepared by:
ENVIRONMENTAL SCIENCE CORP.
12065 Lebanon Road
Mt. Juliet, TN 37122
Phone (800) 767-5859
FAX (615) 758-5859

Report to: Mr. Tom White
Email: twhite@envsci.com
Project Description: Demo report
City/State Collected
Phone: (615) 758-5858
FAX: (615) 758-5859
Client Project #: UPPB
Lab Project #: EMERALD-UPPB
Collected by (print):
Site/Facility ID#: 12345
P.O.#: 99999999999
Collected by (signature):
Packed on Ice N ___ Y ___
Rush? (Lab MUST Be Notified)
___Same Day 200%
___ Next Day 100%
___ Two Day 50%
Date Results Needed
Email? ___No X Yes
FAX? ___No ___Yes

Acctnum: EMERALD (lab use only)
Template/Prelogin: T33311/ P158345
Cooler #:
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	Metals 250mlHDPE-HNO3	SV8081 250ml Amb-No Pres	SV8270 1L-Amb-NoPres	SVOCS 1L-Amb NoPres SV8310	V8260 40ml Amb-HCl	SV8141 1L - AMB	SV8151 1L - AMB	Remarks/Contaminant	Sample # (lab only)
MW-1		GW				6	X	X	X	X	X	X	X		L219795-01
MW-2		GW				6	X	X	X	X	X	X	X		-02
MW-3		GW				6	X	X	X	X	X	X	X		-03
MW-4		GW				6	X	X	X	X	X	X	X		-04

*Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐UPS ☒FedEx ☐Courier ☐	Condition:	(lab use only)
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 4°C Bottles Received:		
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12/25 Time:	pH Checked:	NCF:

FIGURE 5.8.7d

SAMPLE CONTAINER LABEL

ABC WASTEWATER PLANT

Prepared by Environmental Science Corp.

Project: Annual Sludge - SOUR/Class "B" Fecal

Proj #: 57243

Sample Location/ID: Sludge Digester

Analysis Req'd: Class "B" Fecal Coliform

NaThio Preservative Included

Date:_____ Time:_____

FIGURE 5.8.7e

SAMPLE CONTAINER CUSTODY SEAL

CUSTODY SEAL

Date:_____ **I-CHEM**

Chemists In The Container Business™

Signature: _____

FIGURE 5.8.7f

SAMPLE LOGIN LABEL

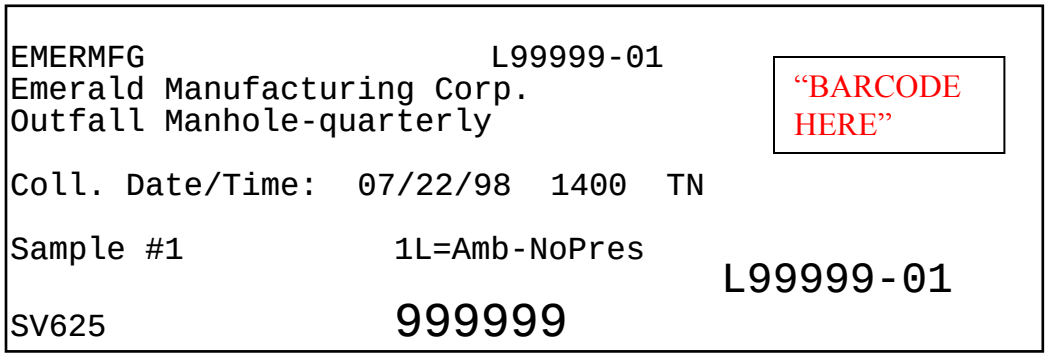


FIGURE 5.8.7g

EXAMPLE LAB PREPARATION SHEET

ENVIRONMENTAL SCIENCE CORP.

Laboratory Sample Prep Sheet

Date Created: 4/13/2007
Analyst: 196
Method: Hg
Matrix: Solid

Mercury by CVAA

Workgroup: WG295556

Samples

Account	Sample Name	Method	Weight(g)	Volume(mL)	Sample Description
[redacted]	L288458-01	7471A	0.58	30	Brown sludge
[redacted]	L288518-01	7471A	0.58	30	Brown clay
[redacted]	L288519-01	7471A	0.60	30	Brown clay
[redacted]	L288868-10	7471A	0.58	30	dark-brown clay
[redacted]	L288920-03	7471A	0.55	30	Purple paint
[redacted]	L288936-01	7471A	0.63	30	Brown clay
[redacted]	L288936-02	7471A	0.63	30	Brown clay
[redacted]	L288936-03	7471A	0.57	30	Brown clay
[redacted]	L288936-04	7471A	0.63	30	Brown clay
[redacted]	L288936-05	7471A	0.62	30	Brown clay
[redacted]	L288968-01	7471A	0.59	30	Black sludge
[redacted]	L288996-05	7471A	0.58	30	Brown sediment, rocks
[redacted]	L288997-20	7471A	0.57	30	Black sediment, rocks
[redacted]	L288997-21	7471A	0.57	30	Dark-brown sediment, rocks
[redacted]	L289003-01	7471A	0.59	30	Brown sludge
[redacted]	L289030-01	7471A	0.61	30	Grey clay
[redacted]	L289030-03	7471A	0.59	30	Grey clay
[redacted]	L289076-01	7471A	0.60	30	Brown sand, rocks
[redacted]	L289076-02	7471A	0.60	30	sand, rocks
[redacted]	L289095-01	7471A	0.58	30	Multicolored, rocks

QC Samples

Blank	BLKWG295556	7471A	0.60	30	Brown sand
LCS	LCSWG295556	7471A	0.10	30	Brown soil
DUP	L289076-01DUP	7471A	0.60	30	Brown sand, rocks
MS	L289076-02MS	7471A	0.60	30	Brown sand, rocks
MSD	L289076-02MSD	7471A	0.60	30	Brown sand, rocks

4/13/2007 11:05:50 PM 1 of 1

FIGURE 5.8.7h

EXAMPLE LAB ASSIGNMENT/WORKSHEETS

ENVIRONMENTAL SCIENCE CORP.

Laboratory Bench Sheet

TOTAL PHENOL BY 4AAP

Date Created: 4/2/2007
Analyst: 156
Method: 4AAP
Matrix: Water

Instrument: Lachat5

Workgroup: WG293700
Calibration Date: 03/15/07
Calib. Corr.: 0.999990
Units: mg/L

Prep Date: 4/2/2007

PrepStart: 11:20 PM
PrepEnd: 1:00 PM

Reagents

Reagent Name	Standard Number	Expiration Date
4 AAP	7D02049	04/03/07
PHENOL BUFFER	7C28009	04/04/07

Samples

Sample Name	Workgroup	Results	Dilution	Report Value	Qualifiers
L285470-02	WG293700	0.076	1	0.076**	
L286297-02	WG293700	-0.0208	1	<0.04	
L286321-02	WG293700	-0.0079	1	<0.04	
L286335-02	WG293700	0.0274	1	<0.04	
L286401-02	WG293700	0.0076	1	<0.04	
L286618-02	WG293700	0.0125	1	<0.04	
L286703-01	WG293700	0.042	1	0.042**	
L286703-02	WG293700	0.006	1	<0.04	
L286788-01	WG293700	0.0066	1	<0.04	
L286788-02	WG293700	0.0087	1	<0.04	
L286788-03	WG293700	0.0128	1	<0.04	
L286807-01	WG293700	0.162	1	0.162**	
L286807-02	WG293700	1.16	1	1.16**	
L286807-03	WG293700	0.069	1	0.069**	
L286807-04	WG293700	0.149	1	0.149**	

FIGURE 5.8.7i
EXAMPLE SAMPLE CONFIRMATION REPORT

Environmental Science Corp.
Login Confirmation Report
Apr 17 2007, 06:17 pm
Login Number: L3547 Template Number: N/A
Account: EMERALD Emerald Manufacturing

Report To: Tom White
: 12065 Lebanon Road
:
: Mount Juliet, TN, 37122
Telephone #: 615-758-5858
Fax #: -758-5859
Email: twhite@envsci.com;tomwhite@comcast.net
Project/Account Comments:

Client Project #: APP1
Project Description:
PO#: 1234
PO# Required: N
Lab Project #: EMERALD-123
Client Design: DEFAULT

TSR:151
Payment Terms: Net 30
Regulatory State: TN
Fax Report: N
Quote#:
Report Design:

Lab Sample #	Test	Sample ID	Desc.	Collect Date & Time	Collected By	Site	Receive Date	PR	Est.DueDate(1)	Method		Unit Price
L3547-01		MW-1		01-Nov-04, 12:00	Tom White	TN56383752	02-NOV-04	QR	09-NOV-04			
GW	P AP1		Appendix I List								$	250.00
GW	C AGICP		Silver		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
GW	C BAICP		Barium		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
GW	C BEICP		Beryllium		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
GW	C CDICP		Cadmium		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
GW	C COICP		Cobalt		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
GW	C CRICP		Chromium		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
GW	C CUICP		Copper		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
GW	C HG		Mercury		4625010	250mlHDPE-HNO3	DEFAULT			7470A	$	0.00
GW	C NIICP		Nickel		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
GW	C PBICP		Lead		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
GW	C SEICP		Selenium		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
GW	C SV8011		EDB/DBCP		4625011	40mlAmb-HCl	DEFAULT			8011	$	0.00
GW	C TLG		Thallium by ICPMS		4625010	250mlHDPE-HNO3	DEFAULT			6020	$	0.00
GW	C V8260AP1		App I Volatiles		4625011	40mlAmb-HCl	DEFAULT			8260B	$	0.00
GW	C ZNICP		Zinc		4625010	250mlHDPE-HNO3	DEFAULT			6010B	$	0.00
L3547-02		MW-2		01-Nov-04, 12:00	Tom White	TN56383752	02-NOV-04	QR	09-NOV-04			
Groundwater project												
GW	P AP1		Appendix I List								$	250.00
GW	C AGICP		Silver				DEFAULT		1 Bottles	6010B	$	0.00
GW	C BAICP		Barium				DEFAULT		1 Bottles	6010B	$	0.00
GW	C BEICP		Beryllium				DEFAULT		1 Bottles	6010B	$	0.00
GW	C CDICP		Cadmium				DEFAULT		1 Bottles	6010B	$	0.00
GW	C COICP		Cobalt				DEFAULT		1 Bottles	6010B	$	0.00
GW	C CRICP		Chromium				DEFAULT		1 Bottles	6010B	$	0.00
GW	C CUICP		Copper				DEFAULT		1 Bottles	6010B	$	0.00
GW	C HG		Mercury				DEFAULT		1 Bottles	7470A	$	0.00
GW	C NIICP		Nickel				DEFAULT		1 Bottles	6010B	$	0.00
GW	C PBICP		Lead				DEFAULT		1 Bottles	6010B	$	0.00
GW	C SEICP		Selenium				DEFAULT		1 Bottles	6010B	$	0.00
GW	C SV8011		EDB/DBCP				DEFAULT		2 Bottles	8011	$	0.00
GW	C TLG		Thallium by ICPMS				DEFAULT		1 Bottles	6020	$	0.00
GW	C V8260AP1		App I Volatiles				DEFAULT		2 Bottles	8260B	$	0.00
GW	C ZNICP		Zinc				DEFAULT		1 Bottles	6010B	$	0.00
L3547-03		MW-3		01-Nov-04, 12:00	Tom White	TN56383752	02-NOV-04	QR	09-NOV-04			

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Entered 28-JUN-02 By SEEDPAK

(1) Due Date listed is an estimate based on average workloads. Please communicate required due dates to your TSR.

5.9 QUALITY CONTROL

5.9.1 Quality Control Procedures

ESC has established quality control procedures for monitoring the validity of stated analytical methods. The resulting data are recorded in such a way that trends are detectable.

5.9.2 Quality Control Activities

Monitoring of quality may include the following:

- regular use of certified reference materials and/or internal quality control using secondary reference materials;
- participation in interlaboratory comparison or proficiency testing programs;
- replicate analyses
- re-testing or re-calibration
- logic check or correlation of results from related analyses
- The identification and analysis of developing data trends by the use of control charts.

5.9.2.1 Quality control data are analyzed using statistical techniques and, where they are found to be outside pre-defined criteria, planned action is taken to correct the problem and to prevent incorrect results from being reported.

5.9.2.2 Laboratory Checks

See Section 3 for a description of QC samples and related definitions.

Table 5.9.2.2 BASIC LABORATORY QC CHECKS

QC Check Sample	Source	Prep Required
Method/reagent blanks - One blank is carried through each step of the analytical procedure for each batch of samples. Blanks are prepared for each preparation method and matrix (i.e., solids assay, dissolved metals, TCLP extraction, etc.). Blanks are used to confirm the absence of contaminants within the preparation and/or analytical system prior to and during the analysis of field samples.	Lab DI	Yes
Initial Calibration Verification (ICV) – An independently prepared standard used to verify the accuracy of the initial calibration (for ongoing calibration)	Primary or Secondary	No *
Laboratory Control Sample (LCS) – A known clean matrix is spiked with known amounts of the analyte(s) of interest used to verify the efficiency of the analytical system without interference from the field sample matrix. The LCS provides the best estimate of analytical system performance and may also be used to verify the validity of the on-going calibration.	Secondary	Yes
Continuing Reference Standard Checks – Metals and Organics; *Also called SSCV (Secondary Source Calibration Verification) – An independently prepared standard used to verify the accuracy of the existing calibration.	Secondary	No
Continuing Calibration Verification (CCV) - A standard, usually near the mid-point of the calibration curve, made from the primary or same standard stock used for the calibration curve. The CCV is used to represent the ongoing calibration stability of the instrument and must perform within method stated criteria.	Primary	No *
Sample Matrix Spikes and Spike Duplicates (MS/MSD) –Prepared field samples spiked with known quantities of target analyte and carried through the entire preparation and analytical process concurrently with unspiked field samples to assess the effect of the sample matrix on the target analytes present and to provide an estimate of analytical precision. For analyses where field sample type does not allow for MS/MSD preparation (i.e. lead wipes, air samples on charcoal tubes, etc.) an LCS/LCSD pair may be substituted.	Primary or Secondary	Yes
Post Digestion Spike – (used in metals analysis) A standard prepared from a previously analyzed spiked sample digestate that yielded reduced recovery for the target analyte due to a suspected matrix interferent.	Primary	No
Sample Duplicates – Second aliquots of field samples carried through the entire preparation and analytical process that used as an indication of sample precision or consistency in the field sample matrix.	Client Sample	Yes
Surrogate Standards – Analytes not expected to occur naturally in field samples that are spiked by preparation/analytical personnel to assess sample preparation and analytical efficiency in each individual field sample.	NA	Yes
Internal Standards– Analytes not expected to occur naturally in field samples that are spiked to provide a consistent basis for comparison with target analyte concentrations. ISTDs are used in internal calibration models.	NA	No

***** Preparation requirements can vary depending on method. Requirements are listed in each individual determinative SOP.

5.9.2.3 Batch QC Criteria

5.9.2.3.1 Environmental Samples

Sample Batch - Defined as a set of 20 or fewer samples of a similar matrix prepared and/or analyzed concurrently. The maximum number of samples possible per batch is dependent on the determinative method allowance.

Required Instrument QC per batch:

- Calibration Blank (CB or CCB)
- Initial Calibration Verification (ICV)
- (1) Continuing Calibration Verification (CCV) every 10-20 samples where and as required.
- (1) CCV at end of run where required.
- (1) Post-Digestion Spike – Metals analysis
- (1) Serial Dilution – Metals analysis

NOTE: The CCV is typically a mid-point concentration. In addition to the mid-point, where required, the CCV is run at a concentration that varies from the mid-point by +/-25% during each analytical run. The varied CCV must meet the same acceptance criteria as the mid-point.

Required Method QC per batch (Must include internal standards and surrogates, where required by the method):

- (1)Method/prep Blank
- (1) Laboratory Control Sample Duplicate Pair, LCS/LCSD must be analyzed for analytes where spiking procedures are not practical, such as total suspended solids, total dissolved solids, total volatile solids, total solids, pH, color, odor, oil& grease, temperature, dissolved oxygen or turbidity
- Matrix Spike/Spike Duplicate (MS/MSD) Pair, MS/MSD must be analyzed except for analytes where spiking procedures are not practical, such as total suspended solids, total dissolved solids, total volatile solids, total solids, pH, color, odor, oil& grease, temperature, dissolved oxygen or turbidity
- (1) Sample Duplicate (where sufficient field sample is available and where required by determinative method)

5.9.2.3.2 Industrial Hygiene Analyses, Including Environmental Lead

Sample Batch - Defined as a set of 20 or fewer samples of a similar matrix prepared and/or analyzed concurrently.

Required Instrument QC per batch:

- Calibration Blank (CB or CCB)
- Initial Calibration Verification (ICV)
- (1) Continuing Calibration Verification (CCV) every 10 samples
- (1) CCV at end of run.
- (1) Post-Digestion Spike – Metals analysis

NOTE: The CCV is typically a mid-point concentration. In addition to the mid-point, the CCV is run at a concentration that varies from the mid-point by +/- 25% during each analytical run. The varied CCV must meet the same acceptance criteria as the mid-point.

Required Method QC per batch:

- (1) method/prep blank
- (1)Laboratory Control Sample/Laboratory Control Sample Duplicate Pair, LCS/LCSD
- Matrix Spike/Spike Duplicate (MS/MSD) pair, where matrix permits
- (1) Sample Duplicate (where sufficient sample is available)

5.9.2.3.3 Batch QC Protocols

If more stringent QC protocols are required than those outlined above for any method or project, then the more stringent method protocols are followed.

5.9.2.4 Inter-Laboratory Quality Control

- Reference samples are ordered from Environmental Resource Associates or similar provider. Samples are purchased to evaluate the following method types: Air, Water Supply, Water Pollution, and Solid Waste.
- Blind QC check samples are purchased at least semi-annually from Environmental Resource Associates or similar provider as an external source for performance evaluation samples. These samples are supplied to ESC without the true concentration values. For specific state water pollution programs, two levels are analyzed. The laboratory may perform additional studies as required by contract, regulatory agency or accreditation. ESC reviews the results as an overall check on internal QC procedures. If blind QC check sample results are unacceptable and such information impacts certification the laboratory immediately initiates corrective action and orders another check sample to ensure ongoing proficiency of that analyte.
- Blind field duplicates are collected at least annually to evaluate field collection and laboratory precision. Client field duplicates are collected based on project requirements. The field duplicates are logged in as regular samples and laboratory personnel are unaware of sample origin.
- Split samples are periodically sent to outside laboratories to confirm analytical results.

5.9.2.5 Procedures for Assessing Data Precision, Accuracy and Completeness

The following procedures apply to all analytes measured, unless more stringent QC has been specified. All field measurements must meet the same QC criteria as those run in the lab.

5.9.2.6 Use and Preparation of QC Samples

Certified standards, generated from reference materials, are used to check calibration throughout the analytical run. The standards are obtained from suppliers who are NIST recognized and ISO compliant. A Certificate of Analysis or other documentation verifying purity accompanies the standards.

Sample matrix spikes are prepared using actual samples prior to digestion, extraction, etc. Separate matrix spike limits are calculated for each type of sample (i.e., water, solid, TCLP extract, personnel filter, etc.). Sample duplicate analyses are also initiated prior to digestion, extraction, etc. Duplicate spikes and duplicate laboratory control samples are used to generate precision data.

Table 5.9.2 lists methods used to generate precision and accuracy targets.

TABLE 5.9.2.6 METHODS USED TO GENERATE PRECISION AND ACCURACY TARGETS

Method	Purpose	Method References
Reference Standards (Laboratory Control Sample - LCS)	Accuracy	All analyses
Reference Standards (Dup. Laboratory Control Sample – LCSD)	Precision and Accuracy	All analyses
Matrix Spikes	Accuracy	All quantitative Wet Chemistry analyses. All Metals and Organics.
Duplicate Matrix Spikes	Precision and Accuracy	All quantitative Wet Chemistry analyses. All Metals and Organics.
Sample Duplicates	Precision	All analyses

5.9.2.7 QC Charts

When an analyst completes a reference standard check, a duplicate, or a matrix spike, the result is calculated and compared to the appropriate QC chart and evaluated against the established limits. A rough x-bar or duplicate QC graph, with mean, warning and control limits, is available. If the results are out of control limits, the analyst notes this problem for appropriate corrective action. Corrective action is taken, based on an established list of identified corrective action procedures.

Outliers

Control limits, where required, are calculated at least annually according to NELAC standards as identified in SOP 030207, QC Charting. The data are evaluated using ± 4 times the standard deviation or 4σ criteria for outliers. Data that falls outside of ± 4 times the standard deviation are eliminated from the calculation. Data points are not eliminated otherwise, unless an obvious system failure has occurred and the error can be documented and identified.

Control Data Entry

For non-data transfer results, the data entry specialist gathers data directly from the benchsheet and enters it into the computer LIMS or Excel, depending on the origin of the data. For instrumentation with data transfer,

the data is obtained directly from LIMS. The data is then brought into a spreadsheet and the charts can be plotted and evaluated by the computer software.

5.9.2.8 Accuracy

Laboratory Control Standards (LCS)

- Laboratory Control Standards are run with every analytical batch.
- X-bar control charts are generated using a minimum of the last 20 data points, based upon percent recovery.
- Warning limits are set at the 95% confidence interval and are plus/minus two standard deviations from the arithmetic mean.
- Control limits are set at the 99% confidence interval and are plus/minus three standard deviations.
- LCS limits are calculated at least annually where necessary. See the individual laboratory appendices for the list of established limits. Method stated limits override in-house calculated limits.

Percent Recovery:

$$Percent\ \ Recovery\ = \frac{Observed\ \ Concentrat\ \ ion}{True\ \ Concentrat\ \ ion}\ \mathrm{X}\ 100$$

Standard Deviation for Percent Recovery:

$$Sp = \sqrt{\frac{1}{N-1}\sum_{n=1}^{n}(P_i - \bar{x})^2}$$

Where: Sp = Standard deviation for percent recovery

$P_{1,2,3,.}$ = Individual percent recovery results

Matrix Spiked Samples

Spiked samples are typically ten percent of all samples, where matrix and sampling permits. Spiked samples are entered onto similar QC charts with the percent recovery. The target spike concentration routinely used is one to five times the initial concentration of the unspiked sample. This basis for the spike target provides analyte concentrations that do not exceed the range of the analysis and are not too small to be significantly affected by normal data variability. One exception for higher ratios is if an MS is spiked at one to five times the client sample concentration based on historical data but the client sample concentration turns out to be much lower or non-detect, the MS/MSD recovery results would still be usable.

- Matrix spiked samples are run with every analytical batch of samples.
- X-bar control charts are generated using a minimum of the last 20 data points, based upon percent recovery.
- Warning limits are set at the 95% confidence interval and are plus/minus two standard deviations from the arithmetic mean.
- Control limits are set at the 99% confidence interval and are plus/minus three standard deviations.
- MS limits are calculated at least annually or sooner where necessary. See the individual laboratory appendices for the list of established limits.
- Method stated limits supercede in-house calculated limits.

MS/MSD Percent Recovery:

$$\%\ Spike\ Recovery = \frac{Spiked\ sample\ value - initial\ sample\ value}{Concentration\ of\ spike}\ X\ 100$$

Standard Deviation for Percent Recovery:

Calculate using the same formula provided in the previous LCS section.

5.9.2.9 Precision

Precision is assessed through the use of duplicate client and/or QC samples, which constitute approximately 10% of all samples run. The relative percent difference (RPD) is calculated as follows:

$$RPD = \frac{\left|Duplicate\ 1 - Duplicate\ 2\right|}{\left[\frac{(Duplicate\ 1 + Duplicate\ 2)}{2}\right]}\ X\ 100$$

- Duplicates are analyzed with every analytical batch.
- X-bar control charts are generated using a minimum of the last 20 data points, based upon percent recovery.
- Warning limits (WL) are set at the 95% confidence interval using

$$WL = \text{Mean Value} + (2.456 \bullet \text{SD})$$

- Control limits are set at the 99% confidence interval and are plus three standard deviations.

$$CL = \text{Mean Value} + (3.268 \bullet \text{SD})$$

- Limits are calculated at least annually or sooner where necessary. See the individual laboratory Appendices for the list of established limits.
- For Laboratory Control Samples and Matrix Spikes - Calculate RPD using the actual analytical result.
- For Sample Duplicates – Calculate RPD using the actual analytical result.
- Calculate the standard deviation, separately for LCS, MS and Sample Duplicates by matrix, where appropriate.
- Method stated limits override in-house calculated limits.

5.9.2.3.10 5.9.2.10 Marginal Exceedance Limits

Due to the large number of compounds analyzed using some analytical methods, it is statistically likely that accuracy and precision failures occur. Failures that occur on a random basis are deemed as marginal exceedances and must meet the criteria below. Not all regulatory programs allow for the use of marginal exceedance limits. In addition, not all analytical methods meet the requirements for the use of ME limits. Refer to the specific determinative SOP for more guidance regarding use and limitations.

Marginal exceedances must be random events. If failures can demonstrate a pattern or occur with regularity in the same target analyte , the failure is not random and is not considered to be marginally exceeding the method requirements.

In addition, ME limits are utilized for methods with large numbers of target analytes being analyzed concurrently, as in the 8270/625 determinative method.

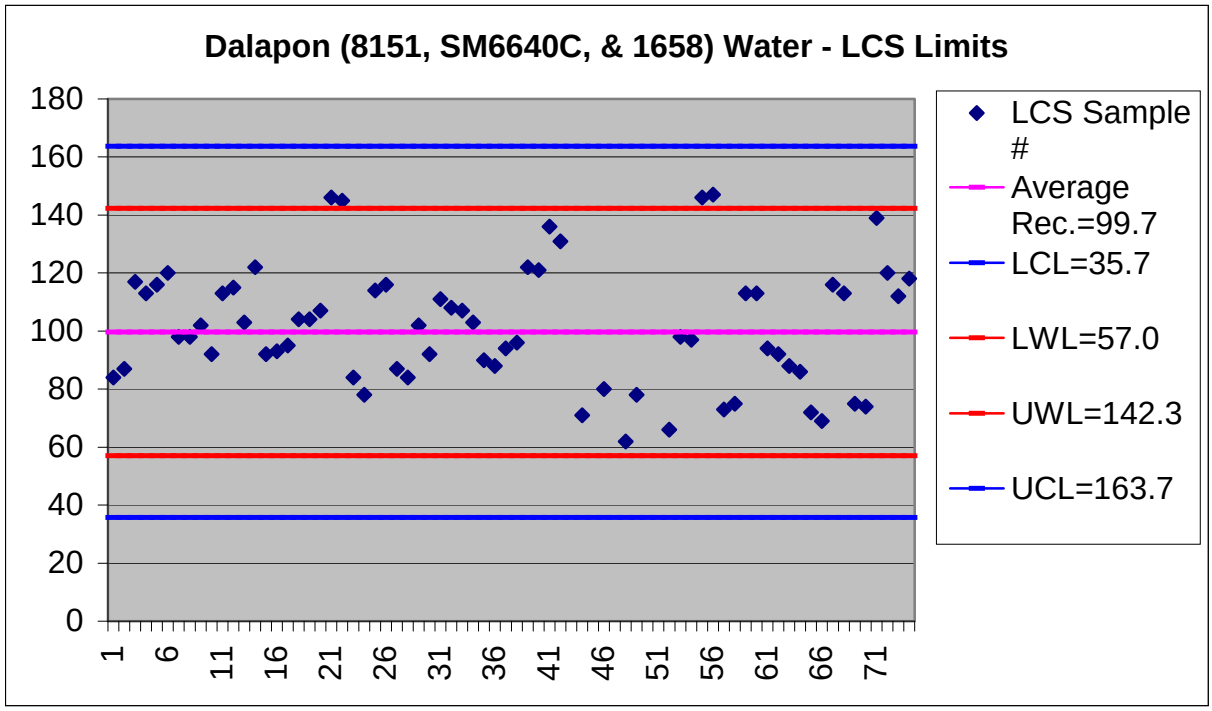
For example, the normal compound list for 8270/625 typically contains 90+ analytes; therefore, per the criteria listed below, only 5 analytes can be considered as marginally exceeding the acceptance criteria. If more than 5 failures occur or if the failures demonstrate a pattern that is causing the outliers, the entire sample batch with associated QC must be re-extracted and re-analyzed.

Upper and lower marginal exceedance (ME) limits are established by +/- four times the standard deviation of historical accuracy data and the number of marginal exceedances allowed is based on the number of analytes spiked in the LCS.

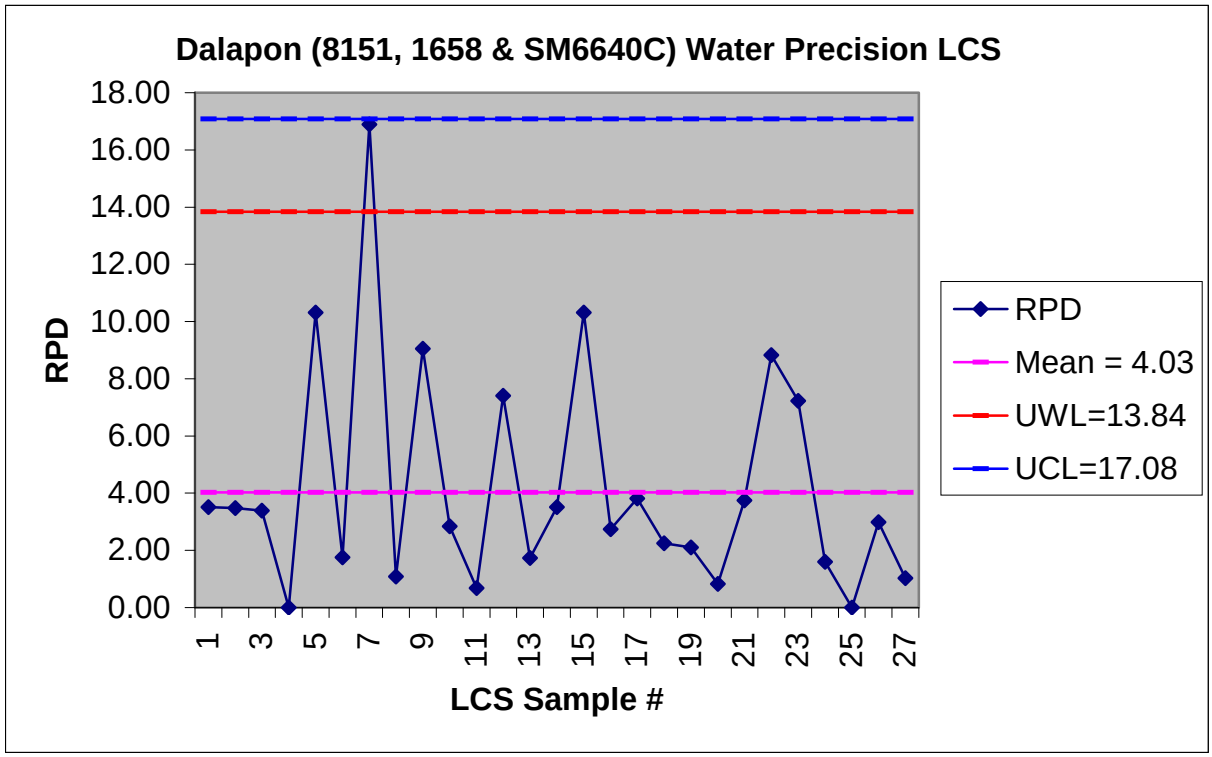
Number of Target Analytes	**Allowable Marginal Exceedance Outliers**
90+	5 analytes allowed in the ME limit
71-90	4 analytes allowed in the ME limit
51-70	3 analytes allowed in the ME limit
31-50	2 analytes allowed in the ME limit
11-30	1 analytes allowed in the ME limit
<10	0 analytes allowed in the ME limit

FIGURE 5.9.2.10 PRECISION AND ACCURACY CHARTS

Dalapon LCS Duplicate Accuracy - Example



Dalapon LCS Duplicate Precision - Example



5.10 FINAL REPORTS/CERTIFICATES

5.10.1 General

The results of each analysis carried out by the laboratory are reported accurately, clearly, unambiguously, objectively, and in accordance with any specific instructions in the regulatory documents or standard operating procedures. The results are normally reported as a final client report and include all the information requested by the client and necessary for the interpretation of the analytical method results and all information required by the method of analysis.

5.10.2 Test Reports

In the case of a written agreement with the client, the results may be reported in a non-standard way and may not require the formalized information, but all associated analytical data is readily available and kept permanently on file for a minimum of 10 years. Specific programs or projects may require a longer data archive period.

Laboratory reports issued to the client for regulatory work, includes, at a minimum, the following information:

- Title – "Report of Analysis"
- Laboratory name, address and phone number
- Client name, address, and contact
- Client name and/or site name
- Client or field identification number
- Collection personnel
- Analyte Name
- Method number for each sample analyses
- Analytical result for each analysis with applicable Data Qualifier as outlined in Table 5.14
- Dilution factor (where applicable)
- Method Detection Limit (when requested)
- Practical Quantitation Limit – designated on final report as RDL
- Date of sample preparation (when requested)
- Time of sample preparation if the holding time is <48 hours (when requested)
- Date of sample analysis
- Temperature at which pH measurements are made
- Date and time of sample collection from the Chain of Custody form
- Units of measurement
- Wet/Dry weight ID – Dry weight includes total solids value
- Identification of all laboratories providing analytical results in the report, including the appropriate laboratory certification numbers from all certifying agencies. The "S" qualifier is used when analyses have been subcontracted.

- Individual report statements: "The reported analytical results relate only to the sample submitted." and "This report shall not be reproduced, except in full, without written approval from ESC".
- Approval Signature
- Sequential page numbering with total pages identified.
- Date/Time Printed
- Revision date – if any
- Laboratory certification numbers as assigned by each certifying agency.
- In conjunction with Ohio VAP projects, a signed affidavit is also required.

An example of a final client report is presented in below.

Figure 5.10.2
Example Final Client Report

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

[redacted]

Report Summary

Friday April 26, 2013

Report Number: I[redacted]
Samples Received: 04/17/13
Client Project: [redacted]
Description: [redacted] Sanitary Landfill

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: _____

Tom Mellette , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.
Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

Figure 5.10.2
Example Final Client Report

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

[redacted]

April 26, 2013

Date Received : April 17, 2013
Description : [redacted] Sanitary Landfill - Leachate

Sample ID : LEACHATE

Collected By : [redacted]
Collection Date : 04/16/13 16:00

ESC Sample # : [redacted]-01

Site ID : [redacted]

Project # : [redacted]

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chloride	530	10.	mg/l	9056	04/18/13	10
Sulfate	120	50.	mg/l	9056	04/18/13	10
Alkalinity	850	200	mg/l	2320 B-2011	04/19/13	10
BOD	18.0	5.00	mg/l	5210 B-2011	04/22/13	1
COD	210	10.	mg/l	410.4	04/20/13	1
Ammonia Nitrogen	12.	0.10	mg/l	350.1	04/24/13	1
pH	8.3		su	9040C	04/19/13	1
Dissolved Solids	1900	10.	mg/l	2540 C-2011	04/19/13	1
Suspended Solids	21.	1.0	mg/l	2540 D-2011	04/19/13	1
Calcium	69.	0.50	mg/l	6010B	04/25/13	1
Iron	1.7	0.10	mg/l	6010B	04/25/13	1
Potassium,Dissolved	110	0.50	mg/l	6010B	04/23/13	1
Sodium,Dissolved	420	0.50	mg/l	6010B	04/23/13	1
Volatile Organics						
Acetone	BDL	0.050	mg/l	8260B	04/18/13	1
Benzene	BDL	0.0010	mg/l	8260B	04/18/13	1
Bromodichloromethane	BDL	0.0010	mg/l	8260B	04/18/13	1
Bromoform	BDL	0.0010	mg/l	8260B	04/18/13	1
Bromomethane	BDL	0.0050	mg/l	8260B	04/18/13	1
Carbon disulfide	BDL	0.0010	mg/l	8260B	04/18/13	1
Carbon tetrachloride	BDL	0.0010	mg/l	8260B	04/18/13	1
Chlorobenzene	BDL	0.0010	mg/l	8260B	04/18/13	1
Chlorodibromomethane	BDL	0.0010	mg/l	8260B	04/18/13	1
Chloroethane	BDL	0.0050	mg/l	8260B	04/18/13	1
2-Chloroethyl vinyl ether	BDL	0.050	mg/l	8260B	04/18/13	1
Chloroform	BDL	0.0050	mg/l	8260B	04/18/13	1
Chloromethane	BDL	0.0025	mg/l	8260B	04/18/13	1
1,1-Dichloroethane	BDL	0.0010	mg/l	8260B	04/18/13	1
1,2-Dibromoethane	BDL	0.0010	mg/l	8260B	04/18/13	1
1,2-Dichloroethane	BDL	0.0010	mg/l	8260B	04/18/13	1
1,3-Dichloropropane	BDL	0.0010	mg/l	8260B	04/18/13	1
1,1-Dichloroethene	BDL	0.0010	mg/l	8260B	04/18/13	1
cis-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	04/18/13	1
Dichlorodifluoromethane	BDL	0.0050	mg/l	8260B	04/18/13	1
trans-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	04/18/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
L630883-01 (PH) - 8.3@18.5c

Figure 5.10.2
Example Final Client Report

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

April 26, 2013

[redacted]

Date Received : April 17, 2013
Description : [redacted] Sanitary Landfill - Leachate

Sample ID : LEACHATE

Collected By : [redacted]
Collection Date : 04/16/13 16:00

ESC Sample # : [redacted]-01

Site ID : [redacted]

Project # : [redacted]

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
1,2-Dichloropropane	BDL	0.0010	mg/l	8260B	04/18/13	1
cis-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	04/18/13	1
trans-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	04/18/13	1
Ethylbenzene	BDL	0.0010	mg/l	8260B	04/18/13	1
2-Hexanone	BDL	0.010	mg/l	8260B	04/18/13	1
2-Butanone (MEK)	BDL	0.010	mg/l	8260B	04/18/13	1
Methylene Chloride	BDL	0.0050	mg/l	8260B	04/18/13	1
Methyl tert-butyl ether	BDL	0.0050	mg/l	8260B	04/18/13	1
4-Methyl-2-pentanone (MIBK)	BDL	0.010	mg/l	8260B	04/18/13	1
Styrene	BDL	0.0010	mg/l	8260B	04/18/13	1
1,1,2,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	04/18/13	1
Tetrachloroethene	BDL	0.0010	mg/l	8260B	04/18/13	1
Toluene	BDL	0.0050	mg/l	8260B	04/18/13	1
1,1,1-Trichloroethane	BDL	0.0010	mg/l	8260B	04/18/13	1
1,1,2-Trichloroethane	BDL	0.0010	mg/l	8260B	04/18/13	1
Trichloroethene	BDL	0.0010	mg/l	8260B	04/18/13	1
Vinyl acetate	BDL	0.010	mg/l	8260B	04/18/13	1
Vinyl chloride	BDL	0.0010	mg/l	8260B	04/18/13	1
Xylenes, Total	BDL	0.0030	mg/l	8260B	04/18/13	1
Surrogate Recovery						
Toluene-d8	96.3		% Rec.	8260B	04/18/13	1
Dibromofluoromethane	96.1		% Rec.	8260B	04/18/13	1
4-Bromofluorobenzene	96.8		% Rec.	8260B	04/18/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.

.
Reported: 04/26/13 09:25 Printed: 04/26/13 09:26
L630883-01 (PH) - 8.3@18.5c

The following qualifier codes are used when reporting data values that either meet the specified description outlined below or do not meet the quality control criteria of the laboratory:

(This table provided for example and is subject to revision without notice. For a list current qualifiers, contact the laboratory)

Table 5.10.2 ESC Qualifiers and Descriptions (Updated 7/15/09)

QUAL	DESCRIPTION
A	ALC(EPA)-Aldol Condensation: Labels a suspected Aldol Condensation product for TICs.
B	(EPA) - The indicated compound was found in the associated method blank as well as the laboratory sample.
B1	(ESC) - The blank depletion was greater than the recommended maximum depletion of 0.2mg/L.
B2	(ESC) - The detection limit has been elevated due to blank contamination.
B3	(ESC) - The indicated compound was found in the associated method blank, but all reported samples were non-detect.
B4	(ESC) - The indicated compound was found in the associated instrument blank, but all reported samples were non-detect.
B5	(ESC) - The indicated compound was found in the associated instrument blank as well as the laboratory sample.
C	CBC(EPA)-Cannot be calculated: The analytical result cannot be calculated because the internal standard was not found.
D	Less than lower calibration limit. Actual value is known to be less than the lower calibration range due to dilution.
E	GTL (EPA) - Greater than upper calibration limit: Actual value is known to be greater than the upper calibration range.
F	SRN (EPA) - Diluted: The original sample was diluted due to high amounts of one or more target analytes. All associated method analytes will be subject to an elevated detection limit relative to the dilution factor.
G	SRS(EPA)-Secondary Dilution: The indicated analysis results were generated from a secondary dilution of the same sample. The sample had to undergo serial dilution.
H	RIN(EPA)-Re-Analyzed: The indicated analytical results were generated from a reinjection of the same sample extract or aliquot.
I1	(ESC) Not analyzed due to interference. (Sample reacted with method reagent or could not be analyzed due to interferences that could not be corrected)
J	(EPA) - Estimated value below the lowest calibration point. Confidence correlates with concentration.
J+	The associated batch QC was outside the upper control limits; associated data has a potential positive bias
J-	The associated batch QC was outside the lower control limits; associated data has a potential negative bias
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low
J7	Surrogate recovery limits cannot be evaluated; surrogates were diluted out
J8	The internal standard associated with this data responded abnormally low. The data is likely to show a high bias concerning the result.
J9	The internal standard associated with this data responded abnormally high. The data is likely to show a low bias concerning the result.
K	REX(EPA)- Re-prepared: The indicated analytical results were generated from a re-extraction or preparation of the sample.
L	(ESC)Sample Pretreatment: The sample reaction impaired the ability to analyze the sample using normal analytical determination. Treatment outside of method protocol was required to determine the analytical result.
L1	(ESC) The associated batch LCS exceeded the upper control limit, which indicates a high bias; The sample analyte was "not detected" and is therefore unaffected.

Table 5.10.2 ESC Qualifiers and Descriptions (Updated 7/15/09)

QUAL	DESCRIPTION
L2	(ESC) The associated surrogate compound falls below 10%. The data should be used with caution. A re-extraction was not possible due to limited sample volume.
L3	(ESC) Sample reanalysis could not be performed due to lack of additional volume.
M	AVE(EPA)-Average Value: Used to report a range of values; e.g., relative response factors
N	PRE (EPA) - Presumptive evidence of material.
N8	PRE (EPA) - Presumptive evidence. The component has been tentatively identified based on mass spectral data.
N9	PRE (EPA) - Presumptive evidence. There is indication that the analyte is present, but QC requirements for confirmation were not met
O	(ESC) Sample diluted due to matrix interferences that impaired the ability to make an accurate analytical determination. The detection limit is elevated in order to reflect the necessary dilution.
O1	(ESC) The analyte failed both the method required serial dilution test and subsequent post-spike criteria. These failures indicate matrix interference.
P	NRP(EPA)-Non-Reproducible: Results of two or more injections are not comparable
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
Q	(ESC) Sample held beyond the accepted holding time.
R	REJ(EPA)-Rejected: Results have been rejected by the lab and should not be used
S	Subcontracted (ESC) - This analysis was performed by a subcontractor chosen to meet the project requirements.
T	(ESC) - Additional method/sample information: Sample collected using improper field protocol
T1	(ESC) - Additional method/sample information: Sample(s) received at greater than 4 degrees C.
T2	(ESC) - Additional method/sample information: The laboratory analysis was from an unpreserved or improperly preserved sample.
T3	(ESC) - Additional method/sample information: TOX analysis. Greater than 10% Breakthrough
T4	(ESC) - Additional method/sample information: QNS - Quantity Not Sufficient
T5	(ESC) - Additional method/sample information: QNS - Quantity not sufficient for reanalysis or replication as required by method.
T6	(ESC) - Additional method/sample information: Method used is an alternative to current approved methodology
T7	(ESC) - Additional method/sample information: Method 1664 (Total Oil & Grease), performed without silica gel
T8	(ESC) - Additional method/sample information: Sample(s) received past/too close to holding time expiration.
T9	(ESC) - Additional method/sample information: The sample result represents blank correction
U	BDL (EPA) - Below Detectable Limits: Indicates that the compound was analyzed but not detected.
V	(ESC) - Additional QC Info: The sample concentration is too high to evaluate accurate spike recoveries.
V1	(ESC) - Additional QC Info: Estimated concentration: due to inability to achieve ending QC standard as a result of sample matrix interference.
V2	(ESC) - Additional QC Info: The Total Cyanide value was below the reporting limit. Amenable Cyanide is assumed not to be present.
V3	(ESC) - Additional QC Info: The internal standard exhibited poor recovery due to sample matrix interference. The analytical results will be biased high. BDL results will be unaffected.
V4	(ESC) - Additional QC Info: Cont. Calibration Verification exhibited a response outside of the QC criteria, but within a 5% window. The associated analytical results are biased high. Non-detect results are unaffected.
V5	(ESC) - Additional QC Info: The Laboratory Control Sample exhibited a response outside of the QC criteria, but within a 5% window. The associated analytical results are biased high. Non-detect results are unaffected.
V6	(ESC) - Additional QC Info: The ICV responded above the recovery range for one of the following: Al, Ca, K, Fe, Na, Zn. The associated analytical results are biased high.
V7	(ESC) - Additional QC Info: This compound is not a 524.2 compound and was therefore evaluated using 8260B QC Criteria.
V8	(ESC) - Additional QC Info: The Interference Check Standard responded above the acceptable recovery range. The associated analytical result may be biased high for this element.

Table
5.10.2 ESC Qualifiers and Descriptions (Updated 7/15/09)

QUAL	DESCRIPTION
V9	(ESC) - Additional QC Info: Please refer to the Case Narrative provided with the report.
W	(ESC)-The laboratory analysis was from a sample collected in an improper container
W1	(ESC) - The laboratory analysis was from a sample collected in containers provided by the client.
W2	(ESC) - Insufficient sample amount to perform method as required. Sample amount approved per client instruction.
W3	(ESC) - BOD cannot be determined due to apparent toxicity exhibited by the sample.
X	(ESC)-Holding time exceeded due to National Emergency
X1	(ESC)-National Emergency: Temperature requirement has been exceeded due to delayed transportation.
Y	This sample most closely matches the laboratory standard for Kerosene
Y0	Significant peaks were detected outside of the hydrocarbon range defined by the method.
Y1	This sample most closely matches the laboratory standard for Diesel
Y2	This sample most closely matches the laboratory standard for #6 Fuel Oil
Y3	This sample most closely matches the laboratory standard for Hydraulic Fluid
Y4	This sample most closely matches the laboratory standard for Motor Oil
Y5	This sample has responded in the Diesel range, however it does not appear to be a hydrocarbon product
Y6	This sample has responded in the Oil range, however it does not appear to be a hydrocarbon product
Y7	This sample most closely matches the laboratory standard for Gasoline
Y8	This sample has responded in the Gasoline range, however it does not appear to be a hydrocarbon product
Y9	Sample has one or more single components in the gasoline range but the chromatographic trace is not characteristic of gasoline.
Z	(ESC)-Too many colonies were present(TNTC), the numeric value represents the filtration volume.

QUALIFIER REPORT INFORMATION:

ESC recognizes and utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program. ESC firmly believes that relevant information pertaining to sample analysis be made available to the ESC client. In addition to the EPA qualifiers adopted by ESC, the laboratory has implemented ESC qualifiers to provide more information pertaining to analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Definitions used in this table can be found in Section 3.

5.10.3 Optional Test Report Items

Where necessary, the final report contains a statement on the estimated uncertainty of measurement.

5.10.4 Calibration Certificates

ESC does not perform calibration activities for clients and therefore does not issue calibration certificates.

5.10.5 Opinions and Interpretations

Opinions and interpretations are allowed in final reports, in the form of qualifiers, provided that it is clear that the qualifiers are present to provide additional analytical information. In the event that a report must be issued with a revision, the original report remains unaltered and the revision is clearly identified. See SOP #030223, *Report Revision.*

5.10.6 Results from Subcontractors

ESC receives analytical reports from subcontracted laboratories. Results from subcontracted laboratories are clearly identified on the ESC client report.

5.10.7 Electronic Transmission of Results

Data packages are provided when requested by the client. They range from QC summaries to "CLP-like" packages with raw data. When a data package is requested at the beginning of a project, the level of package is identified, and it is then logged into the LIMS using the appropriate product code.

The analyst performing the analysis or a QC Specialist generates the QC documentation. The package is generated using the following process:

- Data and Supporting documentation is gathered by the QC Specialist (QCS)
- The package is formatted to the client request and submitted for review:
- Section Supervisor or Senior analyst
- Technical Specialist, Department Manager, Lab Director or designee.
- Once the reviews are complete, the package is logged, copied/scanned/burned to CD, and shipped. The ESC preferred means of delivery is via ESC's secure web site (PDF format) in recognition of the paperwork reduction act.
- See Table 10.8 for typical data package information.

5.10.8 Format of Reports

ESC client reports are designed to represent the analytical results unambiguously. Each client also has the option of using our web site to design a "custom" electronic report that will present results, historical data, and show trends in a format that is downloadable to a client database.

Client reports include the following information:

Table 5.10.8 Data Package Contents

Level I Level II	**Standard QC Data Package Provided Upon Request**
	Final Analytical Report with qualifiers where necessary
	Sub-Contract Final Report if applicable
	Chain of Custody (COC) Form
	Method Blank
	Matrix Spike/Spike Duplicate Summary (MS/MSD) - with Control Limits
	Laboratory Control Sample Summary (LCS) - with Control Limits
	Reporting Limits listed on all reports
	Surrogate Recoveries for GC and GC/MS analyses (on final report)
	Case Narrative upon request
Level III	**Data Package Provided Upon Request**
	All QC Data Included in Levels I and II plus:
	MS/MSD analysis performed on specific sample upon request
	Initial and Continuing Calibration Information
	Instrument blank performance
Level III - Mod	**Data Package Provided Upon Request**
	All QC Data Included in Levels I, II and III plus:
	Chromatograms, including Batch QC, and Samples
Level III - Mod	**Data Package Provided Upon Request**
	Quantitation Reports
	Analysis Log
	Extraction Logs
Level IV	**Data Package Provided Upon Request**
	("CLP-Like" Validation Package)
	All QC Data Included in Levels I, II, III and III mod plus:
	Multiple Sample Dilutions Reported
	Before/After reports when manual integration is necessary (where requested)
	Initial and Continuing Calibration Chromatograms and Quantitation
	Surrogate, Tune, Internal Std & Method Blank summary forms
	Standard Preparation Logs

5.10.9 Amendments to Reports

Reports that are amended after issue to the client, the amended report is clearly identified as such and a reference to the original report is made. The process is described in SOP 030223, *Report Revision*.

5.11 LABORATORY DATA REDUCTION *(SOP 030201 Data Handling & Reporting)*

The primary analyst completes the majority of data reduction using the following:

- Spreadsheet calculation.
- Input of raw data for computer processing.
- Direct acquisition of raw data by computer.

5.11.1 Spreadsheet Calculations

All data that are not captured by automatic acquisition are calculated using approved and controlled spreadsheets. No hand-calculations are performed. Any spreadsheets used are controlled, verified and locked to prevent unintentional changes.

5.11.2 Data Input

If data is input and processed using a computer, a hard copy of the input and output is reviewed to ensure that no discrepancies exist. The persons entering the data and reviewing the data sign the data. The samples analyzed are evident. The data is identified by date analyzed or sample log number; in addition, a disc or tape backup is archived. Data files are uniquely identified by log number/parameter or date analyzed.

5.11.3 Data Acquisition

If data is directly acquired from instrumentation and processed, the analyst reviews the following for accuracy: sample log numbers, calibration constants, response factors, reporting units, and established numerical values used for detection limits (if a value is reported as less than the MDL). The analyst signs and dates the resulting output.

Data that are produced by instrumentation such as calibration curves, absorbance responses, chromatograms, etc. are identified with the following information:

- Date of analysis and initials of analyst
- Initials of review analyst
- Instrument Identification
- Type of analysis

Instrument run logs can be cross-referenced by date to access information on instrument conditions.

5.11.4 Analytical Data Records

Manual data entries are done with indelible ink. All errors are corrected with a single line strikethrough followed by initials and date. The corrected entry appears adjacent to the incorrect entry.

Manual Data:

All manual analytical data represents the following:

- Lab Sample ID
- Analysis Type and Method Number
- Date of analysis
- Prep Date/time
- Time of analysis (if holding time <72 hours)
- Instrument ID
- Calibration Date
- Analyst Initials
- Required QC
- Calculations
- Matrix
- Sample volume/amount
- Dilutions (if any)
- Units of measure
- Correlation coefficient
- Reagent ID – cross reference to preparation date/origin
- Standard ID – cross reference to preparation date/origin
- Calculations where required (manual)
- Qualifiers
- Comments where necessary
- Reviewer initials

Instrument Data:

The instrument printout and supporting data represents the following:

- Instrument ID – cross reference to maintenance log and instrument conditions
- Date/time of analysis
- Injection log/Sample run log
- Operator ID
- Instrument Responses
- Chromatograms/printouts (including manual integrations)
- Units of measure
- Sample amount/volume
- Dilutions
- Sample ID
- QC Samples
- Calibration Date
- Filename
- Comments
- Analyst Initials
- Review Initials
- Standard ID – cross reference to preparation date/origin
- Software version
- Method ID

5.12 DATA VALIDATION PROCESS

5.12.1 Chain of Custody Review

One of the first steps in the validation process is review of the chain of custody (COC). The COC is reviewed first when the sample arrives. It is checked for completeness as well as time accountability. If the COC is complete and accurate, it is then processed through the system. If any irregularity is found, a non-conformance sheet is filled out, with the TSR sign-off, etc. The samples are released for analysis upon approval of the COC.

5.12.2 Field Data

Field data must meet all calibration and continuing calibration requirements. All field data is reviewed for accuracy and completeness. The field data must be approved before it can be entered onto a report. The Environmental Monitoring Manager reviews recorded field data. Field QC criteria are explained in detail in Section 5.7 and in Appendix III.

5.12.3 Laboratory Analysis, QC, and Data Review

Lab Analyst

- After the COC has been reviewed and the sample has been logged in, the laboratory performs all required analyses. The Lab Supervisors are responsible for ensuring that all samples are run within holding time.
- At the beginning of each analysis or sample preparation, the analyst is responsible for making sure that all laboratory ID numbers on the sample bottles match those listed on the benchsheet or logbook.
- Sample transfer from bottle to container is periodically spot checked by a qualified senior analyst.
- Upon completion of the analysis the analyst verifies that analytical information and results are correct and complete, the appropriate SOP has been followed, manual integrations (where applicable) have been correctly performed and documented per the manual integration SOP, QC samples are within established limits, and supporting documentation is complete.
- The benchsheet is then given to a QC Specialist who reviews the same information and ensures all portions of the benchsheet are complete.
- The review person then initials and dates the benchsheet.

Extraction/Sample Prep

- The Department supervisor's are responsible for reviewing all extraction/ preparation logs. The review verifies completeness regarding method, sample amount, reagent amount, times, temperatures, etc.
- The extraction/prep logs are reviewed for sample prep method as well as sample extraction date versus holding time.

Final Data Responsibility

- The Department supervisor for each section of the laboratory is responsible for reviewing instrument run logs and benchsheets to ensure that the samples are being prepared and analyzed within holding times.
- The QC Specialist performs a final review before the data is approved for input into the computer.
- This review includes performance of the various blanks, precision QC and accuracy QC to determine if the set is within quality control criteria. Data reviews are conducted according to the SOP #030227, *Data Review*, that provides more detail regarding specific steps taken in the review process. In some cases, specific regulatory guidelines on the data review process include additional requirements (i.e. Ohio VAP's data review checklist use) that are also included in the SOP.

- If the data is not approved during the final review process, it is given a pending status and returned to the laboratory.
- Pending data is reviewed for corrective action and may require only re-calculation or may result in re-analysis.

Final Report Review

- For manual data, the reviewed data is entered in the LIMS; the input is reviewed against the raw data by a second person for accuracy.
- Data transfer is reviewed and approved by a QC Specialist.
- The client reports are then prepared for review by the assigned Technical Service Representative (TSR). The report is reviewed for correlation between related parameters as well as possible trends. The TSR reviews related supporting documentation such as chain of custody records, field documents, sample receipt information, compliance with client/project specific requirements, etc.
- All field documents are reviewed and approved before the final review. Field data that does not pass established criteria is not processed through the final report review.
- The Environmental Monitoring Manager is responsible for any corrective actions necessary concerning field results.
- Laboratory result values that appear anomalous are sent back to the laboratory for a second review of the raw data.
- If there is no apparent reason for the anomaly the sample is re-analyzed.
- If the sample holding time has expired, the sample is re-analyzed and flagged.
- If the client desires, a new sample can be collected and evaluated.
- The chain of custody is also reviewed for a final time to ensure that all project objectives have been met.
- The LIMS footnotes any parameters that may exceed established limits as provided by the client.
- When the LIMS notes that a limit has been exceeded, the Technical Service Representative is notified and the client is contacted.

Table 5.12.3 DATA REDUCTION AND VALIDATION FLOW		
Primary Activity	**Supporting Activity**	**Responsibility**
Review of COC	Login Confirmation to Client	Initially by Login Personnel and again by Technical Service Representative
Data Production and Reduction	Supporting documentation	Primary Analyst/Chemist
Review of Laboratory QC	Review of Data Completion and QC Limit Verification	Primary Analyst/Chemist
Approval of Laboratory QC	Review of Data Completion and QC Limit Verification	QC Specialist/Senior Chemist
Approval of ESC Field QC and Data	Review of Field Records	Environmental Monitoring Manager
Data Entry to LIMS	Data Transfer	Analyst followed by QC Specialist
Data Entry to LIMS	Data Transfer - Application of Qualifiers	Data Entry Specialist followed by QC Specialist Verification
Data Entry to LIMS	Manual Entry of Data and Qualifiers	Data Entry Specialist followed by QC Specialist Verification
Draft Final Report Generation	Report printed and given to TSR for Approval	Data Entry Specialist or Administrative Assistant
Final Report Review and Approval	TSR Approval/Signature	Technical Service Representative (TSR)

6.0 WASTE MINIMIZATION/DISPOSAL AND REAGENT STORAGE

ESC's sample disposal policy is founded on RCRA [40 CFR Part 261.4 (d)] and CWA [40 CFR Part 403 (Pretreatment)]. Part 261.4 (Figure 6.1) excludes a sample of waste while it is a sample; however, once no longer fitting the description of a sample, it becomes waste again. The policy is further strengthened by information found in "Less is Better" published by the ACS and developed by the ACS Task Force on RCRA.

The EPA requires that laboratory waste management practice to be conducted consistent with all applicable rules and regulations. Excess reagents, samples and method process wastes must be characterized and disposed of in an acceptable manner. Refer to ESC SOP #030309, Waste Management Plan for detailed information.

6.1 QUARANTINED SOIL SAMPLES

ESC maintains a permit to receive and analyze soils from foreign or quarantined areas. All non-hazardous soil samples are disposed of as originating from a quarantined area. All unconsumed soil samples and containers are sterilized in accordance with the current USDA regulations found in 7 CFR 301.81. Both container and contents are dry-heated at 450°F for two minutes, then crushed prior to disposal into a sanitary landfill.

6.2 MOLD/BIOHAZARD SAMPLE DISPOSAL

The laboratory has contracted a local licensed medical waste removal and disposal firm to remove all biohazard and medical waste generated by the laboratory. All waste arriving at the treatment facility is incinerated or steam sterilized complying with all Federal, State, County and local rules, regulations and ordinances. The medical waste containers are picked up at least weekly and confirmation records are available in the laboratory.

All wastes classified as non-biohazard are disposed of via the sanitary sewer following treatment with a disinfectant such as Chlorox (hypochlorite) until the disinfectant and waste liquid is one part disinfectant and five parts waste liquid. Waste disposal records indicating the disposal method are available in the laboratory.

6.3 REAGENTS, STORAGE AND WASTE DISPOSAL

6.3.1 Reagents:

- All chemicals are at least ACS reagent-grade or better.
- All reagents and chemicals are checked for quality, purity and acceptability upon arrival in the laboratory.
- Each chemical container displays the following information: date opened and the expiration date.
- All reagent solutions prepared in-house contain the following information: date prepared, analyst initials, expiration date, and reagent name. In house reagents are recorded with the same information in a reagent prep book assigned to that method.
- Purchased reagent solutions are labeled when received and opened and with the expiration date.

6.3.2 Storage:

- Reagents requiring refrigeration are stored in the area of use in a suitable refrigerated storage that is separate from sample storage.
- Reagents and standards used for volatile organic analysis are stored in a separate refrigerator and are not stored with samples.
- See the following table for more information regarding reagent storage.

Item	Reagent Storage
Acids	Designated acid storage cabinets, in original container.
Organic Reagents - Flammables	Stored in flammables cabinet on separate air system from volatiles analysis.
Liquid Bases	Stored in designated cabinet, away from acids.
Solid Reagents	General cabinet storage.
Refrigerated Aqueous Reagents/Standards	Stored in walk-in cooler on designated shelves, away from samples.
Stable Standard Solutions	Storage cabinet designated in each laboratory for standards.
Dehydrated Media	Dehydrated media is stored at an even temperature in a cool dry place away from direct sunlight. Media is discarded if it begins to cake, discolor, or show signs of deterioration. If the manufacturer establishes an expiration date, the media is discarded after that date. The time limit for unopened bottles is 2 years at room temperature. Where needed comparisons of recovery of newly purchased lots of media against proven lots, using recent pure-culture isolates and natural samples, are performed.
Pure Biological Cultures	All organisms are stored on Tryptic Soy Agar at 4°C in a dedicated refrigerator located in the biology department

6.3.3 Disposal:

- All excess, out of date or unneeded chemicals, reagents and standards are sent to the ESSH Office to ensure proper disposal. Excess chemicals designated as hazardous waste are lab packed and disposed of according to local, State and Federal regulations. Final disposal method is dependant on the classification of each individual chemical. Some sample extracts, chemicals or standards designated as hazardous waste may be disposed of into appropriate satellite accumulation areas. Any additional EPA waste codes resulting from addition of standard are applied to the satellite container, if applicable.

- ESH prohibits the sink disposal of chemicals, the intentional release of chemicals through chemical fume hoods and mixing of nonhazardous lab trash with hazardous waste.
- Sample and reagent/solvent disposal is handled in different ways according to toxicity.
  - Ø Solvents, reagents, samples and wastes are segregated according to base/acid, reactive/non-reactive, flammable/non-flammable, hazardous/non-hazardous, soil/liquid etc. Samples are grouped together relevant to these categories and are disposed of accordingly.
  - Ø
  - Ø
  - Ø Table 6.1 lists waste disposal methods for various test byproducts.
- Upon receipt and login, each sample is coded by sample matrix type. The codes divide samples into the following groups: air, industrial hygiene, wastewater, cake sludge, soil, drinking water, food and miscellaneous. As laboratory personnel review the data reported, the method of disposal is also determined.
- The TSR is notified if samples are to be returned to the client.

6.4 CONTAMINATION CONTROL

6.4.1 Metals

The metals lab conducts quarterly wipe testing in order to ensure that the environment is contaminant free. All critical areas are included and a record is kept of the sampling plan (including locations) and results. Bench tops, balances, digestion equipment, and instrument areas are evaluated against the regulatory limit. Any detectable concentration must be $\leq$1/2 of the established regulatory limit for each metal being analyzed. If any detectable amount exceeds the established criteria, then the area must be cleaned and verified before analysis can resume.

6.4.2 VOCs

The VOC Lab is physically separated from the Extraction Laboratory in order to eliminate contamination caused by the use of extraction solvents. Contamination is monitored daily through the use of instrument/method blanks.

6.4.3 Biological Lab

The aquatic toxicity testing, mold testing, and all other biological determinations are performed in the administrative building and are therefore physically separated from processes involving solvent or other chemical use. The mold lab conducts monthly analyses to ensure that the laboratory environment is contaminant free. All critical areas are included and a record is kept of the sampling plan (including locations) and results.

TABLE 6.1 - WASTE DISPOSAL

NOTE: This information is a general guide and is not intended to be inclusive of all waste or hazardous samples.

PARAMETER	WASTE PRODUCTS	WASTE CLASSIFICATION	DISPOSAL METHOD
Acidity	slightly alkaline water	none	neutralize-sanitary sewer
Alkalinity	slightly acidic	none	neutralize-sanitary sewer
BOD, 5-day	Sample waste only	none	sanitary sewer
COD	acid waste, Hg, Ag, Cr+6	corrosive, toxic	dispose via haz waste regulations
Conductivity	None		
Cyanide, Total	acidic waste	corrosive	neutralize-sanitary sewer
Cyanide, Amenable	acidic waste	corrosive	neutralize-sanitary sewer
Flashpoint	Misc. Organic waste contiaining Chlorobenzene	Flammable	Dispose via haz waste regulations
Fluoride, Electrode	neutral waste solution	none	sanitary sewer
Hardness, Total	pH 10.0 alkaline waste	none	neutralize-sanitary sewer
Extraction/prep	methylene chloride and hexane	toxic solvents	Reclaim for resale
Methylene Blue Active Sub.	Acidic Chloroform Waste	toxic & acidic	dispose via haz waste regulations
Nitrogen-Ammonia	alkaline liquids	corrosive	neutralize-sanitary sewer
Nitrogen-Total Kjeldahl	Trace Hg in alkaline liquid	corrosive toxic	neutralize-sanitary sewer
Nitrogen-Nitrate, Nitrite	mild alkaline waste	none	sanitary sewer
Oil & Grease and Petroleum/Mineral Oil & Grease	Hexane	Toxic solvent	dispose via haz waste regulations
pH	Sample waste only	none	sanitary sewer
Phenols	slightly alkaline, non-amenable CN-	none	sanitary sewer
Phosphate-Total and Ortho	combined reagent	listed	sanitary sewer
Reactive CN & S	Acidic waste	corrosive	Neutralize - sanitary sewer; waste is monitored for CN
Solids, Total (% solids)	None		
Solids, Total Dissolved	None		
Solids, Total Suspended	None		
Turbidity	None	none	none
Metals	acids, metal solutions	corrosive, toxic	highly toxic metal standards and samples - dispose via haz waste regulations
Volatile Organics	methanol	toxic solvents	dispose via haz waste regulations
Extractable Organics	solvents, standards	toxic solvents	dispose via haz waste regulations
Biological Non-biohazardous Waste	Food samples, enrichment broth,	none	Disinfect – sanitary sewer

PARAMETER	WASTE PRODUCTS	WASTE CLASSIFICATION	DISPOSAL METHOD
Biological Non-biohazardous Waste	Gloves, plastic containers	none	Standard refuse

FIGURE 6.1 (*reprint of excerpt – current as of 3/12/08*)

40 CFR PART 261-IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

Subpart A-General Sec.

Sec.261.4 Exclusions.

(d) **Samples.** (1) Except as provided in paragraph (d)(2) of this section, a sample of solid waste or a sample of water, soil, or air, which is collected for the sole purpose of testing to determine its characteristics or composition, is not subject to any requirements of this part or parts 262 through 268 or part 270 or part 124 of this chapter or to the notification requirements of section 3010 of RCRA, when:

(i) The sample is being transported to a laboratory for the purpose of testing; or

(ii) The sample is being transported back to the sample collector after testing; or

(iii) The sample is being stored by the sample collector before transport to a laboratory for testing; or

(iv) The sample is being stored in a laboratory before testing; or

(v) The sample is being stored in a laboratory after testing but before it is returned to the sample collector; or

(vi) The sample is being stored temporarily in the laboratory after testing for a specific purpose (for example, until conclusion of a court case or enforcement action where further testing of the sample may be necessary).

(2) In order to qualify for the exemption in paragraphs (d)(1) (i) and (ii) of this section, a sample collector shipping samples to a laboratory and a laboratory returning samples to a collector must:

(i) Comply with U.S. Department of Transportation (DOT), U.S. Postal Service (USPS), or any other applicable shipping requirements; or

(ii) Comply with the following requirements if the sample collector determines that DOT, USPS, or other shipping requirements do not apply to the shipment of the sample:

(A) Assure that the following information accompanies the sample:

(1) The sample collector's name, mailing address, and telephone number;

(2) The laboratory's name, mailing address, and telephone number;

(3) The quantity of the sample;

(4) The date of shipment; and

(5) A description of the sample.

(B) Package the sample so that it does not leak, spill, or vaporize from its packaging.

(3) This exemption does not apply if the laboratory determines that the waste is hazardous but the laboratory is no longer meeting any of the conditions stated in paragraph (d)(1) of this section.

ESC Site Plan

APPENDIX I TO THE ESC QUALITY ASSURANCE MANUAL

for

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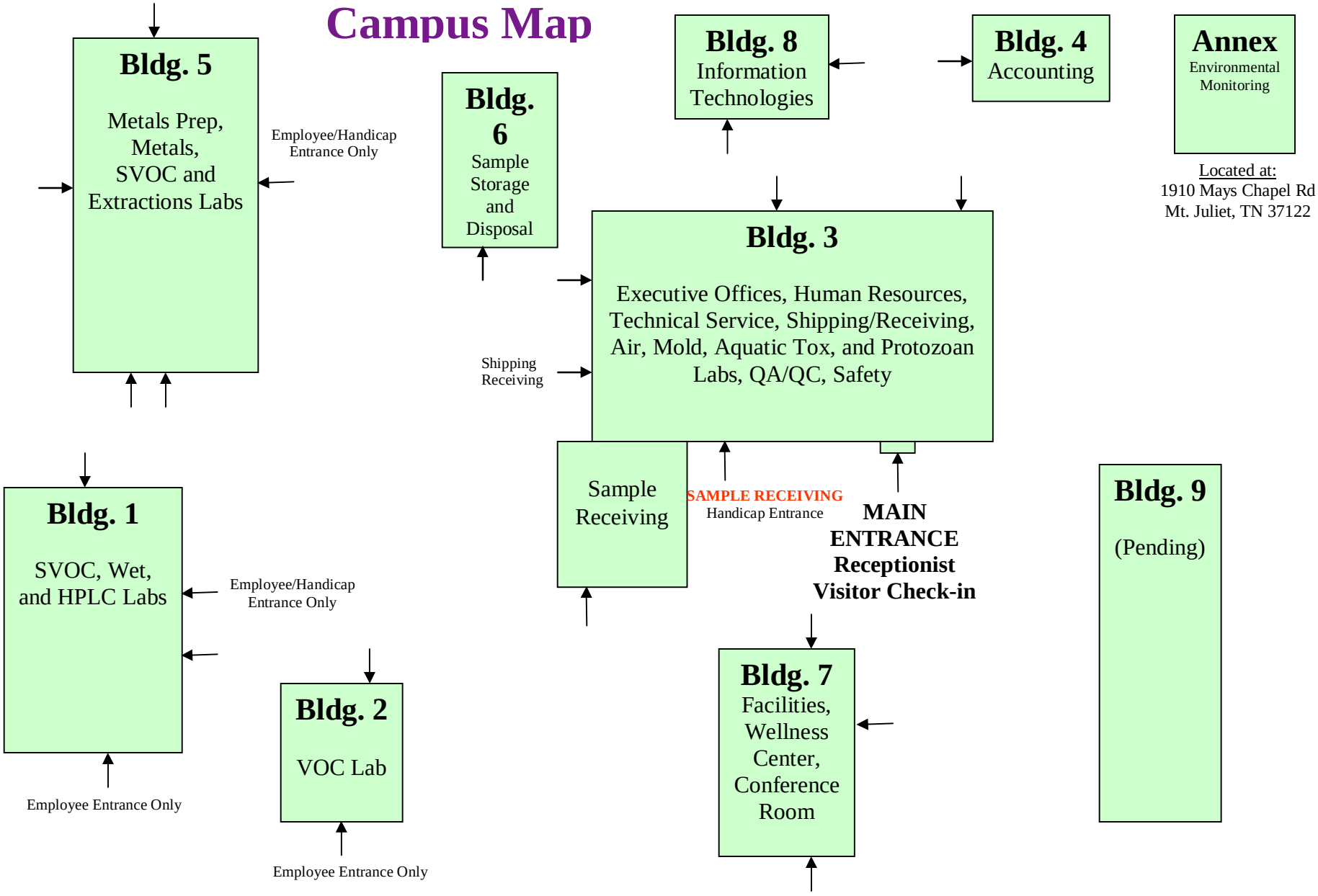
Campus Map


Bldg. 5
Metals Prep, Metals, SVOC and Extractions Labs
Employee/Handicap Entrance Only
Bldg. 6
Sample Storage and Disposal
Bldg. 8
Information Technologies
Bldg. 4
Accounting
Annex
Environmental Monitoring
Located at:
1910 Mays Chapel Rd
Mt. Juliet, TN 37122
Bldg. 3
Executive Offices, Human Resources, Technical Service, Shipping/Receiving, Air, Mold, Aquatic Tox, and Protozoan Labs, QA/QC, Safety
Shipping
Receiving
Sample Receiving
SAMPLE RECEIVING
Handicap Entrance
MAIN ENTRANCE
Receptionist
Visitor Check-in
Bldg. 9
(Pending)
Bldg. 1
SVOC, Wet, and HPLC Labs
Employee/Handicap Entrance Only
Employee Entrance Only
Bldg. 2
VOC Lab
Employee Entrance Only
Bldg. 7
Facilities, Wellness Center, Conference Room

ESC Certifications

APPENDIX II TO THE ESC QUALITY ASSURANCE MANUAL

for

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ESC Lab Sciences
Certifications
Appendix II to the ESC QAM
Updated 2/22/13

App. II, Ver. 11.0
Date: April 15, 2013

State/ Agency	Certificate Number	Expiration Date/ Status	Cert. REV. Date	Date Posted	Certified Programs	Approved Programs	Cert. Type	Cert. Authority
Alabama	40660	5/31/13		6/20/12	DW	WW, RCRA, UST	Reciprocity	TN
Alaska	UST-080	1/11/14		1/21/13	UST	UST	AK	AK
Arizona	AZ0612	6/25/13	4/17/12	6/20/12	AIR, DW, WW, RCRA, UST		Audit	AZ
Arkansas	88-0469	1/21/13		3/20/12	WW, RCRA, UST, BIoassay		NELAP	NJ
California	01157CA	8/31/13	09/21/11	12/11/12	WW, RCRA, UST		NELAP	NJ
Colorado	None	3/31/13		4/2/12	DW	WW, RCRA, UST	Reciprocity	TN
Connecticut	PH-0197	3/31/13		4/28/11	DW	WW, RCRA, UST	Reciprocity	TN, NJ
Florida	E87487	6/30/13		12/11/12	AIR, DW, WW, RCRA, UST		NELAP	NJ
Georgia DW	923	6/16/13		1/21/11	DW		Reciprocity	TN
Georgia	None	6/30/13		12/11/12	WW, RCRA, UST		NELAP	NJ
Idaho	TN00003	7/16/13		12/11/12	DW	WW, RCRA, UST	NELAP	NJ
Illinois	200008	11/30/13		12/11/12	DW, WW, RCRA, UST		NELAP	NJ
Indiana	C-TN-01	6/16/13		8/5/10	DW	WW, RCRA, UST	Reciprocity	TN
Iowa	364	5/1/13		6/20/12	WW, RCRA, UST		NELAP	IA
Kansas	E-10277	10/31/13		12/11/12	DW, WW, RCRA, UST		NELAP	NJ
Kentucky DW	90010	12/31/13		1/17/13	DW	WW, RCRA	Reciprocity	TN
Kentucky UST	16	11/30/13		5/24/12	UST		Audit	A2LA
Louisiana	Agency ID 30792	6/30/	Aug-12	12/11/12	WW, RCRA, UST, AIR		NELAP	NJ

Maine	TN0002	7/5/13		12/18/12	DW, WW	RCRA, UST	Reciprocity	TN, NJ
Maryland	324	12/31/13		12/11/12	DW		Reciprocity	TN
Massachusetts	M-TN003	6/30/13		12/11/12	DW,WW	RCRA, UST	Reciprocity	TN
Michigan	9958	6/16/13		8/31/10	DW	WW, RCRA, UST	Reciprocity	TN
Minnesota	047-999-395	12/31/13		12/11/12	WW, RCRA, UST		Audit	MN
Mississippi	None	6/16/13		9/28/10	DW	WW, RCRA, UST	NELAP	NJ
Missouri	340	6/16/13		9/28/10	DW	WW, RCRA, UST	NELAP	NJ
Montana	CERT0086	1/1/14		12/11/12	DW	WW, RCRA, UST	Reciprocity	TN
Nebraska	NA	6/30/13		12/11/12	DW	WW, RCRA, UST	Reciprocity	TN
Nevada	TN-03-2002-34	6/30/13	Extended	12/11/12	WW, DW, RCRA, UST		NELAP	NJ
New Hampshire	2975	5/20/13		6/20/12	DW, WW	RCRA, UST	NELAP	NJ
New Jersey - NELAP	TN002	6/30/13	1/23/13	1/29/13	DW, WW, RCRA, UST, AIR		NELAP	NJ
New Mexico	None	Renewal	Renewal	8/3/2011	DW	WW, RCRA, UST	NELAP	NJ
New York	11742	4/1/13	11/16/	12/11/12	WW, RCRA, UST, AIR		NELAP	NJ
North Carolina DW	DW21704	7/31/13		12/11/12	DW		Audit	NC
North Carolina	Env375	12/31/13		1/8/13	WW, RCRA, UST		Audit	NC
North C. Aquatic Tox	41	11/1/13		12/11/12	Aquatic Toxicity		Audit	NC
North Dakota	R-140	6/30/13		12/11/12	DW, WW, RCRA		Reciprocity	TN, WI
Ohio VAP	CL0069	12/15/13	04/17/12	5/24/12	WW, RCRA, UST, AIR		Audit	OH
Oklahoma	9915	8/31/13	Sep-12	10/6/11	WW, RCRA, UST, BIOASSAY		NELAP	NJ

Oregon	TN200002	1/15/14		12/11/12	DW, WW, RCRA, UST		NELAP	NJ
Pennsylvania	68-02979	12/31/13		12/11/12	DW, WW, RCRA, UST		NELAP	NJ
Rhode Island	221	12/30/13		1/9/13	DW, Env. Lead	WW, RCRA, UST	Reciprocity	TN, AIHA
South Carolina	84004	6/30/13		12/11/12	WW, RCRA, UST		NELAP	NJ
South Dakota	Pending	Pending						
Tennessee DW	2006	6/16/13		7/23/10	DW	WW, RCRA, UST	Audit	TN
Tennessee DW Micro	2006	10/12/15		12/11/12	DW Micro		Audit	TN
Texas Mold	LAB0152	3/10/15		2/13/13	MOLD		NA	TX
Texas - Env	T 104704245 -07-TX	10/31/13		12/11/12	DW, WW, RCRA, AIR		Reciprocity	NJ
Utah	615758585 8	6/30/13		12/11/12	DW, WW, RCRA, UST		NELAP	NJ
Vermont	VT2006	1/5/14		1/10/13	DW	WW, RCRA, UST	Reciprocity	TN
Virginia VELAP	460132	6/14/13		6/20/12	DW, WW, RCRA, UST		NELAP	NJ
Washington	C1915	8/19/2013	8/23/12	12/11/20 12	DW, WW, RCRA, UST, AIR		Audit	A2LA
West Virginia	233	2/28/14		2/18/13	WW, RCRA, UST		Audit	WV
Wisconsin	998093910	8/31/13	Dec-12	12/11/12	WW, RCRA, UST		Audit	WI
Wyoming	A2LA	11/30/13		3/14/12	UST	WW, RCRA	Audit	A2LA
Other Agencies								
A2LA	1461.01	11/30/13	10/11/12	12/11/12	DW, WW, RCRA, UST, AIR, MICRO		Audit	A2LA
AIHA*	100789	6/1/14		5/24/12	IHLAP, ELLAP, EMLAP		Audit	AIHA
DOD	1461.01	11/30/13		3/14/12	RCRA, UST		Audit	A2LA
EPA	TN00003	None			Cryptospiri dium		Audit	EPA

USDA	S-67674	9/27/15		12/11/12	Quarantine Permit		Audit	USDA

(1) A2LA = American Association for Laboratory Accred.
(2) AIHA = American Industrial Hygiene Association
(3) NELAP = National Environmental Laboratory Accred. Program

(4) IHLAP = Industrial Hygiene Laboratory Accred. Program
(5) ELLAP = Environmental Lead Laboratory Accred. Program
(6) EMLAP = Environmental Microbiology Laboratory Accreditation Program
(7) USDA = United States Department of Agriculture
(8) Approved Programs = The state does not have a formal certification program.
(9) Pending = The state is processing our application.
(10) EPA = Environmental Protection Agency

1.0 SIGNATORY APPROVALS

SAMPLING PROTOCOL QUALITY ASSURANCE MANUAL

APPENDIX III TO THE ESC QUALITY ASSURANCE MANUAL

for

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NOTE: The QAM has been approved by the following people. A signed cover page is available upon request

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses the standard practices and procedures utilized by ESC personnel for site selection and sample collection of various matrices. Topics addressed include field QA/QC procedures, together with equipment care and calibration for field sampling activities. Proper collection and handling of samples is of the utmost importance to insure that collected samples are representative of the sampling site. With this goal, proper sampling, handling, preservation, and quality control techniques for each matrix must be established and strictly followed. Precise identification of the collected samples and complete field documentation including a chain of custody are also vital.

ESC Lab Sciences does not provide sampling services for Industrial Hygiene and Environmental Lead analyses. We do require that all samples collected for these programs be sampled using the guidelines established by NIOSH, OSHA or other published protocol.

In addition, ESC Lab Sciences personnel do not conduct sampling in conjunction with the Ohio Voluntary Action Program (VAP).

4.0 LIST OF SAMPLING CAPABILITIES

• Parameter Group	• Sample Source
Extractable Organics	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Volatile Organic Compounds (VOCs)	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Metals	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Inorganic Anions	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Organics	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Physical Properties	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Cyanide	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Microbiology	Surface water, groundwater, drinking water, wastewater
Macro Invertebrate	Surface water, wastewater, sediments

• Parameter Group	• Sample Source
Identification	
Biotoxicity	Surface water and wastewater

5.0 GENERAL CONSIDERATIONS

The following procedures are used in all of ESC's sampling activities. These procedures must be considered in relation to the objectives and scope of each sampling event.

5.1 SELECTING A REPRESENTATIVE SAMPLING SITE

Selecting a representative sampling site is dependent upon the matrix to be sampled and type of analyses required. These matrix specific procedures are discussed in subsequent sections.

5.2 SELECTION AND PROPER PREPARATION OF SAMPLING EQUIPMENT

The type of sampling equipment to be used is specific to the sample matrix and the analyses to be conducted. These are discussed later in this section. Section 12.0 describes the equipment cleaning procedures utilized by ESC personnel.

5.3 SAMPLING PROCEDURES FOR INDUSTRIAL HYGIENE AND ENVIRONMENTAL LEAD SAMPLES

ESC does not provide sampling services for industrial hygiene and/or environmental lead analyses. Experienced laboratory personnel can assist with advice on sampling; however, the adequacy and accuracy of sample collection is the client's responsibility.

5.4 SAMPLING EQUIPMENT CONSTRUCTION MATERIALS

To prevent direct contamination or cross-contamination of the collected sample, great attention must be given to the construction material used for sampling equipment. Materials must be inert, non-porous and easy to clean. Preferred materials include Teflon®, glass, stainless steel and plastic. Plastics may not be used for collections where organics are the analytes of interest. Stainless steel may not be used where metallic compounds will be analyzed.

5.5 SELECTION OF PARAMETERS BEING ANALYZED

Parameters for analysis are usually dictated by and based on regulated monitoring conditions (i.e. NPDES or RCRA permits). If these do not apply, analyses are selected by ESC or the client based on federal regulations specific to the matrix being investigated.

5.6 ORDER OF SAMPLE COLLECTION

Unless field conditions demand otherwise, the order of sample collection is as follows:

1. Volatile organic compounds (VOCs)
2. Extractable Organics (includes Total Recoverable Petroleum Hydrocarbons [TRPH], Oil & Grease, Pesticides and Herbicides)
3. Total metals
4. Dissolved metals
5. Microbiological
6. Inorganic (includes Nutrients, Demand, and Physical Properties)
7. Radionuclides

5.7 SPECIAL PRECAUTIONS FOR TRACE CONTAMINANT SAMPLING

Many contaminants can be detected in the parts per billion or parts per trillion range and extreme care must be taken to prevent cross-contamination. Therefore, extra precautions apply where samples are collected for trace contaminants. These precautions include:

- A new pair of disposable latex gloves must be worn at each sampling location.
- Sample containers for samples suspected of containing high concentrations of contaminants shall be sealed in separate plastic bags immediately after collection and preservation.
- If possible, background samples and source samples should be collected by different field sampling teams. If different field teams are not possible, all background samples shall be collected first and placed in separate ice chests or shipping containers. Samples of waste or highly contaminated samples shall not be placed in the same container as environmental samples. Ice chests or shipping containers for source samples or samples that are suspected to contain high concentrations of contaminants are discarded after use.
- If possible, one member of the field team should handle all data recording, while the other members collect samples.
- When sampling surface waters, water samples should always be collected before sediment samples are collected.
- Sample collection activities should proceed from the suspected area of least contamination to the suspected area of greatest contamination.
- ESC personnel should use equipment constructed of Teflon®, stainless steel, or glass that has been properly pre-cleaned (Sections 12.3 & 12.4) for collecting samples for trace metals or organic compounds analyses. Teflon®, glass, or plastic is preferred for collecting samples where trace metals are of concern. Equipment constructed of plastic or PVC shall not be used to collect samples for trace organic compounds analyses.
- When fuel powered units are utilized, they will be placed downwind and away from any sampling activities.
- Monitoring wells with free product shall not be sampled for trace contaminant analysis.

5.8 SAMPLE HANDLING AND MIXING

Sample handling should be kept to a minimum. ESC personnel must use extreme care to avoid sample contamination. If samples are placed in an ice chest, personnel should ensure that sample containers do not become submerged or tip over as this may result in cross-contamination. Small sample containers (e.g., VOCs or bacterial samples) should be placed in airtight plastic bags to prevent cross-contamination.

Once a sample has been collected, it may have to be split into separate containers for different analyses. A liquid sample will be split by shaking the container or stirring the sample contents with a clean pipette or pre-cleaned Teflon® rod. Then the contents are alternately poured into respective sample containers. Items used for stirring must be cleaned in accordance with the guidelines set forth in Section 12.0. Samples for VOCs, Cyanide, Total Phenol, and Oil & Grease must be collected as discrete grabs.

A soil sample may be split but must first be homogenized as thoroughly as possible to ensure representative sub-samples of the parent material. This is accomplished using the quartering method. The soil is placed in a sample pan and divided into quarters. Each quarter is mixed separately then all quarters are mixed together. This is repeated several times until the sample is uniformly mixed. If a round bowl is used, mixing is achieved by stirring the material in a circular fashion with occasionally inversion of the material.

Soil and sediment samples collected for volatile organic compounds shall not be mixed. The appropriate sample container should be filled completely, allowing little to no headspace.

Moisture content inversely affects the accuracy of mixing and splitting a soil sample.

5.9 QUALITY CONTROL SAMPLES

Quality control samples must be collected during all sampling events to demonstrate that the sample materials have not been contaminated by sampling equipment, chemical preservatives, or procedures relating to the sample collection, transportation and storage. A summary of the recommended frequency for collecting field quality control samples is presented in the following:

5.9.1 Quality Control Samples

Number of samples	Precleaned equipment blank[1]	Field cleaned equipment blank	Trip blank (VOCs)	Duplicate
10 or more	minimum of 1 then 5%	minimum of 1 then 5%	one per cooler[2]	minimum one then 10%[3]
5 - 9	one	one	one per cooler[2]	one
less than 5	one	one	one per cooler[2]	Not required, but recommend a minimum of one. USACE projects require one. Client specific QAPP requirements must be considered.

[1] Pre-cleaned blanks are to be collected after the initial decontamination procedure has been completed but before the first sample is collected. Only one pre-cleaned or field-cleaned blank is required if less than 10 samples are collected. Only analyte-free water as defined in this document will be used in the preparation of any field and/or equipment blank.

[2] Where VOC methods are analyzed simultaneously, such as 601/602, only one (1) trip blank is required per cooler.

[3] Duplicate samples are collected for all VOC samples.

5.10 VOLATILE ORGANIC COMPOUND SAMPLING

Water Samples

Generally, groundwater, drinking water and wastewater samples for the analysis of volatile organic compounds are collected in duplicate pre-labeled 40mL vials. During bottle kit preparation in the laboratory, 200µL of concentrated HCl is added to each clean and empty vial. A Teflon® septum is placed in each cap and a cap is placed securely on each vial.

The sampler should check the water being sampled for residual chlorine content. This is done with residual chlorine testing strips. If no chlorine is present, the prepared vials may be filled as needed. If residual chlorine is present, add one crystal of sodium thiosulfate (Na2S2O3) to each vial prior to sampling.

To fill the vial properly, the sample is poured slowly down the inside wall of the vial until a convex meniscus is formed. Care should be taken to minimize turbulence. The cap is then applied to the bottle with the Teflon® side of the septum contacting the sample. Some overflow is lost; however air space in the bottle should be eliminated. Check for air bubbles by inverting the capped vial and tapping against the heel of the hand. This will dislodge bubbles hidden in the cap. If any bubbles are present, repeat the procedure. If unsuccessful, discard the vial and re-sample with a new preserved vial and septum. At a minimum, duplicate vials should always be collected from each sample location.

For analysis using EPA Method 524.2, samples that are suspected to contain residual chlorine, 25mg of ascorbic acid per 40mL of sample is added to each sample vial prior to sampling. Additionally, if analytes that are gases at room temperature (i.e. vinyl chloride, etc.) or any of the analytes in following table are not to be determined, 3mg of sodium thiosulfate is recommended for use to remove residual chlorine during sampling. If residual chlorine is present in the field sample at >5mg/L, then add additional 25mg or ascorbic acid or 3mg of sodium thiosulfate for each 5mg/L of residual chlorine present. Sample vials are then filled as previously described. Following collection and dechlorination, Method 524.2 samples are adjusted to a pH of <2 with HCl.

Acetone	Acrylonitrile	Allyl chloride
2-Butanone	Carbon disulfide	Chloroacetonitrile
1-Chlorobutane	t-1,2-Dichloro-2-butene	1,1-Dichloropropanone
Diethyl ether	Ethyl methacrylate	Hexachloroethane
2-Hexanone	Methacrylonitrile	Methylacrylate
Methyl iodide	Methylmethacrylate	4-Methyl-2-pentanone
Methyl-tert-butyl ether	Nitrobenzene	2-Nitropropane
Pentachloroethane	Propionitrile	Tetrahydrofuran

For more detailed instructions, see the published method.

Soil Samples

Option 1 – Core Sampling Device
Soil samples for volatile organic analysis should be sampled using traditional core sampling methods. Once the core sample is collected, additional samples should be taken using an Encore™ sampler, either 5g or 25g, capped, sealed, and immediately cooled. The holding time for this method is 48 hours.

Option 2 – Pre-weighed Vial
In the other option for volatile soil sampling, 40mL vials with cap, Teflon® lined septum, preservative (5mL sodium bisulfate solution), and stir bar are pre-weighed, either by the user or the manufacturer. The vial is weighed on a balance capable of measuring to 0.01g and labeled with the pre-weighed value. In the field, place roughly 5g of sample into a pre-weighed vial, cap, and then immediately place on ice to achieve a temperature of 4ºC. Exact soil weights can be measured using the pre-weight of the vial and the post-sampling weight. The difference represents the actual weight of the soil sample. The holding time for this method is 14 days.

Unless specifically permitted by the regulatory authority, VOC samples (liquid or solid) should never be mixed or composited.

5.11 OIL AND GREASE SAMPLING

Aqueous samples collected for oil and grease analyses must be collected as discrete grab samples. Sample containers should not be rinsed with sample water prior to sample collection and samples should be collected directly into the sample container. Intermediate vessels should only be used where it is impossible to collect the sample directly into the sample container and, in this case, only Teflon® beakers should be used. Samples should be taken from well-mixed areas.

5.12 CYANIDE SAMPLING

Cyanide is a very reactive and unstable compound and should be analyzed as soon as possible after collection. Samples shall be collected in polyethylene or glass containers and shall be pretreated and preserved in the manner specified in the following paragraphs.

5.12.1 Test for Oxidizing Agents

1. Test the sample with residual chlorine indicator strips.
2. Add a few crystals of ascorbic acid and test until negative.
3. Add an additional 0.6 grams of ascorbic acid for each liter sampled to remove residual chlorine.
4. Preserve the pretreated sample by to a pH > 12.0 with NaOH and cool to 4 $\pm$ 2°C. Verify the pH of the samples as per Section 14.2.
5. Equipment blanks must be handled in the same manner as described in steps 1 through 4.

5.12.2 Test for Sulfide

1. Test the sample for sulfide using the sulfide test strip;(formally HACH KIT).
2. If sulfide is not removed by the procedure below, the sample must be preserved with NaOH to pH > 12.0 and analyzed by the laboratory within 24 hours.
3. Sulfide should be removed by filtering visible particulate. Retain filter (filter #1).
4. Remove the sulfide by adding lead carbonate powder to the filtrate to cause the sulfide to precipitate out.
5. Test the filtrate for the presence of sulfide. If sulfides are present, repeat steps 1 and 4 until no sulfides are shown present.
6. The precipitate can now be filtered from the sample and this filter is discarded.
7. The sample is then reconstituted by adding the sediment collected on filter #1 back to the filtrate.
8. Preserve the pretreated sample to a pH > 12.0 with NaOH and cool to 4 $\pm$ 2°C. Verify the pH of the samples as per Section 14.2
9. Equipment blanks must be handled in the same manner as described in steps 1 through 9.

5.13 BIOMONITORING SAMPLING

Aqueous samples collected for Bioassay can be collected in either glass or HDPE plastic. There is no chemical preservation for this type of sample and the required volume varies with each type of analysis. Following sampling, all samples must be cooled to 4°C and can be held for a maximum of 36 hours from the time of collection. Grab and composite sample protocols are utilized for acute and chronic bioassays and are chosen according to permit requirements. Samples should be collected with minimum aeration during collection and the container should be filled allowing no headspace. Samples may be shipped in one or more 4L (l gal.) CUBITAINERS® or unused plastic "milk" jugs. All sample containers should be rinsed with source water before being filled with sample. Containers are not reused. If the sample is a chlorinated effluent, total residual chlorine must be measured immediately following sample collection.

5.14 PROCEDURES FOR IDENTIFYING POTENTIALLY HAZARDOUS SAMPLES

Any sample either known, or suspected, to be hazardous shall be identified as such on the chain of custody. Information explaining the potential hazard (i.e., corrosive, flammable, poison, etc.) shall also be listed.

5.15 COLLECTION OF AUXILIARY DATA

All auxiliary data shall be entered in the field records. Auxiliary data relative to a particular sampling location should be recorded concurrent with the sample event. Matrix specific auxiliary data are discussed later in this section.

5.16 TIME RECORDS

All records of time shall be kept using local time in the military (24 hour) format and shall be recorded to the nearest minute.

5.17 REFERENCES

ESC maintains copies of the various sampling references in the sample equipment room. Pertinent pages of these documents may be photocopied and taken to the field during sampling investigations. A bibliography of references used in the development of this section is presented in Section 17.

6.0 ANCILLARY EQUIPMENT AND SUPPLIES

The equipment used to collect samples and conduct necessary purging activities is listed in subsequent sections for each type of sample. However, Section 6.1 lists some of the ancillary field equipment and instruments that may be required.

6.1 ANCILLARY EQUIPMENT AND SUPPLIES

Flow Measurement:	ISCO Continuous Flow Meters 3230, 3210, 2870; Flo-Poke pipe insert
Personal Protective Equipment:	Hard Hats, Face Shields, Half- and Full-Face Respirators, Rubber and Latex Gloves, Tyvex protective coveralls, rubber boots, safety glasses
Field Instruments:	Water Level Indicator, Continuous Recording pH Meter, Portable pH/Temperature Meters, Hach DR-100 Chlorine Analyzer, Hach CEL/700 Portable Laboratory, YSI Field Dissolved Oxygen/Temperature Meter w/ Submersible Probe, Portable Field Specific Conductance Meter, Hach 2100P Portable Turbidimeter
Chemical Supplies & Reagents:	Deionized Water, Tap Water, Liquinox Detergent, Isopropanol, Nitric Acid, Hydrochloric Acid, Sulfuric Acid, Sodium Hydroxide, Ascorbic acid, Sodium Thiosulfate, Ascorbic Acid, Zinc Acetate, pH calibration buffers (4.0, 7.0, and 10.0), Hach Sulfide Kit, lead carbonate powder, Specific Conductance Standard, Turbidity Standards
Tools:	Pipe Wrench, Bung Wrench, Crowbar, Hammer, Assorted Screwdrivers, Tape Measures, Channel Lock Pliers, Vise Grip Pliers, Duct Tape, Vinyl Pull Ties
Miscellaneous:	Cellular Phones, Pagers, Walkie Talkies, 12 Volt Batteries, Flashlights, Extension Cords, Brushes, Plastic sheeting, Fire extinguishers, Water Squeeze Bottles, First Aid Kit, lengths of rigid PVC conduit, aquatic sampling nets (Wildco)

7.0 WASTEWATER SAMPLING

7.1 SAMPLING EQUIPMENT

Type	Use	Materials	Permissible Parameter Groups
Continuous Wastewater Samplers-Peristaltic Pump	Sampling	Tygon tubing; glass or plastic sample container	All parameter groups except oil & grease, extractable organics, and VOCs
	Sampling	Teflon® tubing; glass sample container	All parameter groups except VOCs

7.2 GENERAL CONSIDERATIONS

The procedures used by ESC are generally those outlined in the NPDES Compliance Inspection Manual. Additional guidance is given in the EPA Handbook for Monitoring Industrial Wastewater. Some important considerations for obtaining a representative wastewater sample include:

- The sample should be collected where the wastewater is well mixed.
- Samples should not be collected directly from the surface/bottom of the wastestream.
- In sampling from wide conduits, cross-sectional sampling should be considered.
- If manual compositing is employed, the individual sample bottles must be thoroughly mixed before pouring the individual aliquot into the composite container.

7.3 SAMPLING SITE SELECTION

Wastewater samples should be collected at the location specified in the NPDES or sewer use permit if such exists. If the specified sampling location proves unacceptable, the project manager shall select an appropriate location based on site-specific conditions. An attempt should be made to contact the regulating authorities for their approval. The potential for this type of issue highlights the need for a site inspection prior to the scheduled sampling event.

7.3.1 Influent

Influent wastewaters should be sampled at points of high turbulence and mixing. These points are: (1) the upflow siphon following a comminutor (in absence of grit chamber); (2) the upflow distribution box following pumping from main plant wet well; (3) aerated grit chamber; (4) flume throat; or (5) pump wet well when the pump is operating. Raw wastewater samples should be collected upstream of sidestream returns.

7.3.2 Effluent

Effluent samples should be collected at the site specified in the permit or, if no site is specified, at the most representative site downstream from all entering wastewater streams prior to final discharge.

7.3.3 Pond and Lagoon Sampling

Composite samples of pond and lagoon effluent are preferred over grabs due to the potential for ponds and lagoons to short circuit the projected flow paths. However, if dye studies or facility data indicate a homogeneous discharge, grab samples may be taken.

7.4 SAMPLING TECHNIQUES: GENERAL

The choice of a flow-proportional or time-proportional composite sampling program depends upon the variability of flow, equipment availability, sampling point configuration and accessibility. Flow metered sampling is necessary for complete wastewater characterization and should be utilized where possible. If not feasible, a time-proportional composite sample is acceptable.

A time-proportional composite sample consists of aliquots collected at constant time intervals and can be collected either manually or with an automatic sampler.

A flow proportional composite sample consists of aliquots collected automatically at constant flow intervals with an automatic sampler and a flow-measuring device. Prior to flow-proportional sampling, the flow measuring system (primary flow device, totalizer, and recorder) should be examined. The sampler may have to install flow measurement instrumentation if automatic sampling is to be used.

7.5 USE OF AUTOMATIC SAMPLERS

7.5.1 General

Automatic samplers are used when several points are sampled at frequent intervals, with limited personnel, or when a continuous sample is required. Automatic samplers used by ESC must meet the following requirements:

- Must be properly cleaned to avoid cross-contamination from prior sampling events.
- No plastic or metal parts shall come into contact with the sample when parameters to be analyzed could be impacted by these materials.
- Must be able to provide adequate refrigeration. Commercially available ice is placed in the sampler base and packed around the container approximately half way up the sample container.
- Must be able to collect a large enough sample for all required analyses. Composite sample containers (glass or plastic) hold up to 10 liters.
- A minimum of 100 milliliters should be collected each time the sampler is activated.
- Should provide a lift of at least 20 feet and be adjustable so that sample volume is not a function of pumping head.
- Pumping velocity must be adequate to transport solids without settling.
- The intake line must be purged a minimum of one time before each sample is collected.
- The minimum inside diameter of the intake line should be 1/4 inch.
- Have a power source adequate to operate the sampler for 48 hours at 15-minute sampling intervals.
- Facility electrical outlets may be used if available.
- Facility automatic samplers may be used for conventional parameters if they meet ESC QA/QC criteria.

Specific operating instructions, capabilities, capacities, and other pertinent information for automatic samplers presently used by ESC are included in the respective operating manuals and are not presented here.

All data relative to the actual use of automatic equipment on a specific job is recorded in sampling logbooks.

7.5.2 Equipment Installation

7.5.2.1 Conventional Sampling

Automatic samplers may be used to collect time-proportional composite or flow-proportional composite samples. In the flow-proportional mode, the samplers are activated by a compatible flow meter. Flow-proportional samples can also be collected using a discrete sampler and a flow recorder and manually compositing the individual aliquots in flow-proportional amounts.

Installation procedures include cutting and installing the proper length of tubing, positioning it in the wastewater stream, and sampler programming. All new tubing (Dow® Corning Medical Grade Silastic, or equal, in the pump and Tygon®, or equal, in the sample train) will be used for each sampler installation.

For a time-proportional composite, the sampler should be programmed to collect 100mL samples at 15-minute intervals into a refrigerated 10L plastic or glass jug, as appropriate for the particular parameters being analyzed.

For a flow-proportional composite, the sampler should be programmed to collect a minimum of 100mL for each sample interval. The sampling interval should be based on the flow of the waste stream.

7.5.3 Automatic Sampler Maintenance, Calibration, and Quality Control

To ensure proper operation of automatic samplers, the procedures outlined in this section shall be used to maintain and calibrate ESC automatic samplers. Any variance from these procedures will be documented.

Proper sampler operation will be checked by ESC personnel prior to each sampling event. This includes checking operation through three cycles of purge-pump-purge; checking desiccant and replacing if necessary; checking charge date on NiCad batteries to be used; and repairing or replacing any damaged items.

Prior to beginning sampling, the purge-pump-purge cycle shall be checked at least once. The sample volume will be calibrated using a graduated cylinder at least twice, and the flow pacer that activates the sampler shall be checked to be sure it operates properly.

Upon return from a field trip, the sampler shall be examined for damage. The operation will be checked and any required repairs will be performed and documented. The sampler will then be cleaned as outlined in Section 12.

7.6 MANUAL SAMPLING

Manual sampling is normally used for collecting grab samples and for immediate in-situ field analyses. Manual sampling may also be used when it is necessary to evaluate unusual waste stream conditions. If possible, manually collected samples should be collected in the actual sample container that will be submitted to the laboratory. This minimizes the possibility of contamination from an intermediate collection container.

Manual samples are collected by (1) submerging the container neck first into the water; (2) inverting the bottle so that the neck is upright and pointing into the direction of wastewater flow; (3) quickly returning the sample container to the surface; (4) shake to rinse. Pour the contents out downstream of sample location; (5) collect sample as described in steps 1, 2, and 3; pour out a few mLs of sample downstream of sample collection. This allows for addition of preservatives and sample expansion.

Exceptions to the above procedure occur when preservatives are present in the sampling container or when oil & grease, microbiological, and/or VOC analyses are required. In these cases, sample shall be collected directly into the container with no pre-rinsing.

If the water or wastewater stream cannot be physically or safely reached, an intermediate collection container may be used. This container must be properly cleaned (Section 12) and made of an acceptable material. A separate collection container should be used at each sampling station to prevent cross-contamination between stations. The sample is collected by lowering a properly cleaned Teflon®, plastic, or glass collection vessel into the waste stream. The intermediate vessel may be lowered by hand, pole or rope.

7.7 SPECIAL SAMPLE COLLECTION PROCEDURES

7.7.1 Trace Organic Compounds and Metals

Due to the ability to detect trace organic compounds and metals in extremely low concentrations, care must be taken to avoid contamination of the sample. All containers, composite bottles, tubing, etc., used in sample collection for trace organic compounds and metals analyses should be prepared as described in Section 12.

Personnel handling the sample should wear a new pair of disposable latex gloves with each set of samples collected to prevent cross-contamination. A more detailed discussion is given in Section 5.7 under special precautions for trace contaminant sampling.

7.7.2 Bacterial Analysis

Samples for bacterial analysis will always be collected directly into the prepared glass or plastic sample bottle. The sample bottle should be kept closed until immediately prior to sampling and never rinsed with sample. When the container is opened, care should be taken not to contaminate the cap or the inside of the bottle. The bottle should be held near the base and plunged, neck downward, below the surface and turned until the neck points upward and upstream. The bottle should be filled to within one-inch of the top and capped immediately.

Section 14 presents preservation procedures and holding times. As holding times are limited to 6 hours for microbiological analyses, special arrangements may be required to ensure that these samples reach the laboratory within this timeframe.

7.7.3 Immiscible Liquids/Oil and Grease

Oil and grease may be present in wastewater as a surface film, emulsion, solution, or a combination of these forms. A representative sample for oil and grease analysis is difficult to collect. The sampler must carefully evaluate the location of the sampling point to find the area of greatest mixing. Quiescent areas should be avoided.

Because losses of oil and grease will occur on sampling equipment, collection by composite sampler is not practical. Intermediate sampling vessels should not be used if possible. If intermediate collection vessels are required they should be made of Teflon® and be rinsed with the sample three times before transferring any sample to the sample container. Sample containers, however, should never be rinsed.

7.7.4 Volatile Organic Compounds Analyses

Water samples to be analyzed for volatile organic compounds are collected in 40mL pre-preserved (200uL of concentrated HCl) vials with screw caps. A Teflon®-silicone septum is placed in each cap prior to the sampling event. The Teflon® side must be facing the sample side.

Sampling containers with preservatives are pre-labeled prior to any field activities to reduce the chances of confusion during sampling activities. A complete list of sample preservatives, containers, holding times, and volumes is found in Section 14.

The sampler should check the water to be sampled for chlorine. This is done with residual chlorine indicator strips. If no chlorine is found, the vials may be filled. If residual chlorine is present, the sampling and preservation procedures listed in Section 5.10 of this manual must be performed.

7.8 AUXILIARY DATA COLLECTION

While conducting wastewater sampling, the following information may also be gathered:

- Field measurements -- pH, DO, conductivity, temperature
- Flows associated with the samples collected -- continuous flows with composite samples and instantaneous flows with grab samples
- Diagrams and/or written descriptions of the sample locations
- Photographs of pertinent wastewater-associated equipment, such as flow measuring devices, treatment units, etc.
- Completion of applicable forms required during specific investigations.

All observations, measurements, diagrams, etc., will be entered in field logbooks or attached thereto.

8.0 SURFACE WATER AND SEDIMENT SAMPLING

8.1 EQUIPMENT

Equipment Type	Use	Material	Permissible Parameter Groups
Surface Water Sampling			
Kemmerer Sampler	Depth sampling	PVC	All parameter groups except extractable organics, VOCs, and oil & grease
Automatic Samplers	Sampling	Teflon®	All parameter groups except VOCs, oil & grease, & micro
	Sampling	PVC	All parameter groups except extractable organics, VOCs, oil & grease, and micro
Sample Collection Container	Sampling	Stainless steel	All parameter groups
Bailers	Sampling	Teflon®	All parameter groups
	Sampling	PVC	All parameter groups except extractable organics, VOCs, and oil & grease
Sediment Sampling			
Hand Augers	Sampling	Carbon Steel	Demand, nutrients, and extractable organics (for hard packed soils only)
Sediment Core Sampler	Sampling	Stainless Steel, Teflon®	All parameter groups
Encore™	Sampling	Teflon®	VOC Sediment/soil
Scoops	Sampling	Teflon® coated	All parameter groups
Mixing Bowl	Compositing	Glass	All parameter groups except VOCs
Spoons, spatula	Sampling, compositing	Stainless Steel	All parameter groups

8.2 GENERAL

Selection of surface water sampling locations for water quality studies are determined by the objective of the study and waterway type. Factors that impact and alter water quality and characteristics (dams, bridges, discharges, etc.) must be considered. Accessibility is important.

8.3 SAMPLE SITE SELECTION

Fresh water environments are commonly divided into two types: (1) rivers, streams, and creeks; and (2) lakes, ponds, and impoundments. Since these waterways differ considerably in general characteristics, site selection must be adapted to each.

Prior to conducting a sampling event, an initial survey should be conducted to locate prime sampling points. Bridges and piers provide ready access to sampling points across a body of water. However, they should only be used when at otherwise acceptable locations and are found not to be detrimentally impacting stream characteristics.

If wading for water samples must be done, caution should be used to avoid disturbing bottom deposits that could result in increased sediment in the sample. Shallow areas may be best for sediment sampling.

8.3.1 Rivers, Streams, and Creeks

Sampling sites should be located in areas possessing the greatest degree of cross-sectional homogeneity. Such points are easily found directly downstream of a riffle or rapid. These locations are also good for sediment sampling. In the absence of turbulent areas, a site that is clear of immediate point sources, such as tributaries and effluent discharges, may be used.

Typical sediment deposition areas are located at the inside of river bends and down-stream of islands or other obstructions. Sites immediately upstream or downstream from the confluence of two streams or rivers should be avoided due to inadequate mixing of the combining flows. Also, backflow can upset normal flow patterns.

Great attention should be given to site selection along a stream reach:

- Sites should be spaced at intervals based on time-of-water-travel. Sampling sites may be located at about one-half day time-of-water-travel for the first three days downstream of a waste source for the first six sites and then approximately one day for the remaining distance.
- If the study data is for comparison to previous study data, the same sampling sites should be used.
- Sites should be located at marked physical changes in the stream channel.
- Site locations should isolate major discharges as well as major tributaries.

Dams and weirs usually create quiet, deep pools in river reaches that would otherwise be swift and shallow. When times of travel through them are long, sites should be established within them.

Some structures, such as dams, permit overflow that may cause significant aeration of oxygen deficient water. Sites should be located short distances upstream and downstream of these structures to measure the rapid, artificial increase in dissolved oxygen (DO), which is not representative of natural aeration.

A minimum of three sites should be located between any two points of major change in a stream, even if the time-of-travel between the points of change is short. Major changes include, but are not limited to, a waste discharge, a tributary inflow, or a significant change in channel characteristics. Sampling three sites is also important when testing rates of change of unstable constituents. Results from two of three sites will usually support each other and indicate the true pattern of water quality in the sampled zone. If the effect of certain discharges or tributary streams of interest is desired, sites should be located both upstream and downstream of these points.

Due to the tendency of the influent from a waste discharge or tributary to slowly mix, cross-channel, with the main stream, it is nearly impossible to measure their effect immediately downstream of the source. Thus, samples from quarter points may miss the wastes and only indicate the quality of water above the waste source. Conversely, samples taken directly in the stream portion containing the wastes would indicate excessive effects of the wastes with respect to the river as a whole.

Tributaries should be sampled as near the mouth as possible. Often, these may be entered from the main stream for sampling by boat. Care should be taken to avoid collecting water from the main stream that may flow back into the tributary as a result of density differences created by temperature, salinity, or turbidity differences.

Actual sampling locations will vary with the size and amount of turbulence in the stream or river. Generally, with streams less than 20 feet wide, well mixed areas and sampling sites are readily found. In such areas, a single grab sample taken at mid-depth at the center of the channel is adequate. A sediment sample can also be collected at the center of the channel. For slightly larger streams, at least one vertical composite should be taken from mid-stream. It should be composed of at least one sub-surface, mid-depth, and above the bottom sample. Dissolved oxygen, pH, temperature, conductivity, etc. should be measured on each aliquot of the vertical composite. Several locations should be sampled across the channel width on the larger rivers. Vertical composites across the channel width should be located proportional to flow, i.e., closer together toward mid-channel where flow is greater and less toward the banks where the flow proportionally lower.

The field crew will determine the number of vertical composites and sampling depths for each area. They should base their decisions upon two considerations.

1. The larger the number of sub-samples, the more nearly the composite sample will represent the water body.
2. Taking sub-samples is time consuming and expensive, and increases the chance of contamination.

A number of sediment samples should be collected along a cross-section of a river or stream to adequately characterize the bed material. The normal procedure is to sample at quarter points along the cross-section of the site. When the sampling technique or equipment requires that the samples be extruded or transferred at the site, they can be combined into a single composite sample. However, samples of dissimilar composition should not be combined. They should be kept separate for analysis in the laboratory. To ensure representative samples, coring tubes are employed. The quantity of each sub-sample that is composited shall be recorded.

8.3.2 Lakes, Ponds, and Impoundments

Lakes, ponds, and impoundments have a much greater tendency to stratify than rivers and streams. This lack of mixing requires that more samples be obtained from the different strata. Occasionally, extreme turbidity differences occur vertically where a highly turbid river enters a lake. This stratification is caused by temperature differences where the cooler, heavier river water flows beneath the warmer lake water. A temperature profile of the water column and visual observation of lake samples can detect these layers. Each layer of the stratified water column should be sampled.

The number of sampling sites on a lake, pond, or impoundment is determined by the objectives of the investigation dimensions of the basin. In small bodies of water, a single vertical composite at the deepest point may be sufficient. Dissolved oxygen, pH, temperature, etc., should be conducted on each vertical composite aliquot. In naturally formed ponds, the deepest point is usually near the center; in impoundments, the deepest point is usually near the dam.

In lakes and larger impoundments, several vertical sub-samples should be composited to form a single sample. These vertical sampling locations should be along a transaction or grid. The field crew will determine the number of vertical composites and sampling depths for each area. In some cases, separate composites of epilimnetic and hypo-limnetic zones may be required. Additional separate composite samples may be needed to adequately represent water quality in a lake possessing an irregular shape or numerous bays and coves. Additional samples should always be taken where discharges, tributaries, agriculture, and other such factors are suspected of influencing water quality.

When collecting sediment samples in lakes, pond, and reservoirs, the sample site should be as near as possible to the center of the water mass, especially for impoundments of rivers or streams. Generally, coarser grained sediments are deposited at the headwaters of a reservoir, and the finer sediments are near the center. The shape, inflow pattern, bathymetry, and circulation affect the location of sediment sampling sites in large bodies of water.

8.3.3 Control Sites

The collection of samples from control sites is necessary to compile a basis of comparison of water quality. A control site above the point of interest is as important as the sites below, and must be chosen with equal care. Two or three sites above the waste inflow may be necessary to establish the rate at which any unstable material is changing. The time of travel between the sites should be sufficient to permit accurate measurement of the change in the material under consideration.

8.4 SAMPLING EQUIPMENT AND TECHNIQUES

8.4.1 General

Any equipment or sampling techniques used to collect a sample must not alter the integrity of the sample and must be capable of providing a representative sample.

8.4.2 Water Sampling Equipment/Techniques

The physical location of the collector will dictate the type of equipment needed to collect samples. Surface water samples may be collected directly into the sample container when possible. Pre-preserved sample containers shall never be used as intermediate collection containers. Samples collected in this manner shall use the methods specified in Section 7.6 of this manual. If wading into the stream is required, care should be taken not to disturb bottom deposits, which could be unintentionally collected, and bias the sample. Also, the sample should be collected directly into the sample bottle and **up current** of the wader. If wading is not possible or the sample must be collected from more than one depth, additional sampling equipment may be used. If sampling from a powerboat, samples must be collected upwind and upstream of the motor.

8.4.2.1 Sampling Procedure Using a Teflon® or PVC Bailer

If data requirements of surface water sampling do not necessitate sampling from a strictly discrete interval of the water column, Teflon® or PVC constructed bailers can be used for sampling. The type bailer used is dependent on the analytical requirements. A closed top bailer utilizing a bottom check valve will be sufficient for many surface water studies. Water is continually displaced through the bailer as it is lowered down through the water column until the specified depth is attained. At this point, the bailer is retrieved back to the surface. There is the possibility of contamination to the bailer as it is lowered through the upper water layers. Also, this method may not be successful in situations where strong currents are found or where a discrete sample at a specified depth is needed.

If depth specific, discrete samples are needed and the parameters do not require Teflon® coated sampling equipment, a standard Kemmerer sampler may be used. A plastic bucket can also be used to collect surface samples if parameters to be analyzed do not preclude its use. The bucket shall always be rinsed twice with the sample water prior to collection and the rinse water be disposed of downstream from the sample collection point. All field equipment will be cleaned using standard cleaning procedures.

8.4.2.2 Sampling Procedure Using a Kemmerer Sampler

Due to the PVC construction of the Kemmerer sampler, it shall not be used to collect samples for extractable organics, VOCs, and/or oil & grease analysis. The general collection procedure is as follows:

1. Securely attach a suitable line to the Kemmerer bottle.
2. Lock stoppers located at each end of the bottle on the open position. This allows the water to be drawn around the bottom end seal and into the cylinder at the specified depth.
3. The bottle is now in the set position. A separate "messenger" is required to activate the trip mechanism that releases the stopper and closes the bottle.
4. When the bottle is lowered to the desired depth, the messenger is dropped. This unlocks the trip mechanism and forces the closing of both end seals.
5. Raise the sampler, open one of the end seal, and carefully transfer the sample to the appropriate sample container.

8.4.2.3 Sampling Procedures Using Sample Collection Containers

In most cases, sample collection containers are used to collect surface water from easily accessible sampling points. This means that the sample is collected manually, always upstream of the sampling person's position. An extension may be added to the container to make the sampling point more accessible for manual sampling. Extensions can be constructed of aluminum, PVC, steel, or any other suitable material. The sample container is normally attached to the extension using a clamp, vinyl pull ties, or duct tape. Samples collected in this way are done so in the following manner:

1. Place the inverted sample container into the water and lower to the desired depth. Never use a pre-preserved container as an intermediate sample collection device.
2. Re-invert the container with the mouth facing into the direction of flow and at the appropriate depth to collect the desired sample.
3. Carefully raise the container to the surface and transfer to the appropriate container.

8.4.3 Sediment Sampling Equipment/Techniques

A variety of methods can be used to collect sediment samples from a streambed. ESC utilizes corers and scoops. Precautions must be taken to ensure that the sample collected is representative of the streambed. These methods are discussed in the following paragraphs.

8.4.3.1 Sediment Core Samplers

Core sampling is used to collect vertical columns of sediment from the stream or lakebed. Many types of coring devices are available for use depending on the depth of water from which the sample is obtained, the type of bottom material, and the length of the core to be collected. Some devices are weight or gravity driven while others are simple hand push tubes. These devices minimize the loss of fine particles and should always be used when collecting sediment samples from flowing waters.

Coring devices are particularly useful in pollutant monitoring because the shock wave created by sampler descent is minimized and the fines at the sediment-water interface are only slightly disturbed. The sample can be withdrawn primarily intact removing only the layers of interest. Core liners manufactured of Teflon® or plastic can be purchased. These liners reduce the possibility of contamination and can be delivered to the laboratory in the tube they were collected in. Coring devices sample small surface areas and small sample sizes and often require repetitive sampling to obtain a sufficient amount of sample. This is the primary disadvantage to these devices but they are recommended in the sampling of sediments for trace organic compounds or metals analyses.

When sampling sediments in shallow water, the direct use of a core liner is recommended. Stainless steel push tubes are also used because they provide a better cutting edge and higher tensile strength than Teflon® or plastic. One advantage to using the Teflon® or plastic tubes is the elimination of possible metals contamination of the sample from the core barrels or cutting heads. The length of the corer tube should correspond to the desired depth of the layer being sampled. In general, soft sediments adhere better to the inside of the tube and a larger diameter tube can be used. Coarser sediments require the use of a smaller diameter tube of two inches or less to prevent the sample from falling out of the tube. The inside bottom wall of the tube can be filed down to allow easier entry into the substrate.

When samples are obtained by wading, caution should be used to minimize disturbance in the area sampled. Core tubes are pushed directly down into softer substrates until four inches or less of the tube is above the sediment-water interface. A slight rotation of the tube may be necessary to facilitate ease of entry into harder substrates and reduce compaction of the sample. The tube is then capped and slowly extracted and the bottom of the corer is capped before it is pulled above the water surface.

Sub-sampling is performed for VOC samples using an Encore™ sampling device. This device is used to collect soil/sediment samples, while preventing container headspace. Once the core sample is collected, additional samples should be taken using an Encore™ sampler, either 5g or 25g, capped, sealed, and immediately chilled to 4ºC. The holding time for this sampling method is 48 hours. Alternatively, weigh 5g of sample into a pre-weighed vial (with a Teflon® lined screw cap) containing, 5mL sodium bisulfate solution and a magnetic stir bar, cap, and then ice to 4ºC. The holding time for this method is 14 days.

8.4.3.2 Scooping Samples

The easiest and quickest way to collect a sediment sample in shallow water is with a Teflon® coated scoop or stainless steel spoon. This type of sampling should be limited to quiescent (i.e., non-flowing) waters such as lakes or reservoirs.

8.4.3.3 Mixing

As specified in Section 5.8, sediment samples, collected for chemical analysis, should be thoroughly mixed (except for volatile organic compounds analysis) before being placed in the sample containers.

8.5 SPECIAL SAMPLE COLLECTION TECHNIQUES

8.5.1 Trace Organic Compounds and Metals

Samples for trace pollutant analyses in surface water should be collected by dipping the sample containers directly into the water. Sometimes samples are split for enforcement or quality control purposes. A sufficient volume of sample for all containers should be collected in a large glass container and then, while mixing, be alternately dispensed into the appropriate bottles. This cannot be done for volatile organic compound samples due to potential loss of volatile compounds.

Only Teflon® or stainless steel should be used in sediment sampling for trace contaminant analyses. Teflon® coring tubes are the preferred technique.

8.5.2 Bacterial Analysis

Samples for bacteriological examination must be collected in sterilized bottles and protected against contamination. The preferred technique is to collect sample directly into the sample bottle. Hold the bottle near the base and plunge, neck downward, below the surface. The container is then turned with the neck pointed slightly upward and the mouth directed toward the current. The bottle is filled to about ½ inch from the top and recapped immediately. While the bottle is open, extreme care should be used to protect both the bottle and stopper against contamination. The ½ inch air space is left in the bottle to facilitate subsequent shaking in the laboratory.

If sampling with an intermediate sampling device (i.e. bailer), the device shall be thoroughly rinsed with sample water prior to collecting the sample. For this reason, microbiological samples are among the final samples collected from a sampling site. Begin pouring sample out of the sampling device before collecting into the sterilized container. Continue pouring sample out of the device, place the container under the flowing stream, and fill the container to ½ inch from the top. Flow should remain continuous before and during the filling process.

When sampling from a bridge, the sterilized sample bottle can be weighted and lowered to the water on a rope. Collectors must be careful not to dislodge debris from the bridge that could fall into the bottle.

8.6 AUXILIARY DATA COLLECTION

A field logbook will be used to record data pertinent to sampling activities. This data shall describe all sampling locations and techniques, list photographs taken, visual observations, etc. Visual observations of sample site conditions, including weather and overall stream conditions, recorded during the investigation can be valuable in interpreting water quality study results.

8.7 SPLIT AND DUPLICATE SAMPLE COLLECTION

Split samples measure variability between analysts, methods, and laboratories and are taken as subsamples from a single sample. This is unlike duplicate samples that measure variability inherent in the collection method or waste stream and are obtained in close succession during the same sampling event.

8.7.1 Split Sample Collection

Split samples are collected as follows:

1. Sample must be collected in a properly cleaned container constructed of acceptable materials. The volume should be more than twice the volume required for one sample.
2. Add appropriate preservative where required.
3. Mix thoroughly.
4. Alternately, decant sample into subsample containers in increments of approximately 10% of total subsample volume until containers are full.
5. Seal the sample containers with appropriate, airtight caps.
6. Label each sample container with a field number and complete a chain of custody.

NOTE: Volatile organic samples shall not be collected in this manner. Samples for VOC's must be collected as simultaneous, discrete grab samples.

8.7.2 Duplicate Sample Collection

1. Collect two samples in rapid succession.
2. Preserve where required.
3. Mix thoroughly.
4. Seal the sample containers with appropriate, airtight caps.
5. 5. Label each sample container with a field number and complete a chain of custody.

9.0 GROUNDWATER AND DRINKING WATER SAMPLING

9.1 GROUNDWATER AND DRINKING WATER SAMPLING EQUIPMENT

Equipment type	Purpose	Component(s)	Allowable Parameter Groups
Bailers (disposable and non-disposable)	Purging	Teflon® & SS	All parameter groups
	Sampling	Teflon®	All parameter groups
Peristaltic Pump[1]	Purging[2]	Tygon Tubing	All parameter groups except organics
	Purging	Teflon®	All parameter groups
		Silastic Rubber	All parameter groups except organics
ISCO Bladder Pump[3]	Sampling	Stainless Steel, Teflon®	All parameter groups

[1] New or dedicated tubing must be used at individual monitoring well sites.
[2] If sample is not collected immediately after evacuation, tubing shall be withdrawn from the well prior to pump being turned off to prevent back flowing into the well.
[3] Pump will be cleaned after each use.

9.2 GENERAL GROUNDWATER SAMPLING

Groundwater sampling is necessary for a number of purposes. These include, but are not limited to, evaluating potable or industrial water sources, mapping contaminant plume movement at a land disposal or spill site, RCRA compliance monitoring (landfills), or examining a site where groundwater contamination may have or may be occurring.

Normally, groundwater is sampled from a permanent monitoring well. However, this does not exclude collection of samples from a sinkhole, pit, or other drilling or digging site where groundwater is present.

Monitoring wells are not always at the optimum. In these situations, additional wells may need to be drilled. Experienced, knowledgeable individuals (hydrologists, geologists) are needed to site the well and oversee its installation so that representative samples of groundwater can be collected.

ESC utilizes the procedures being reviewed in this section. Further guidance is available in the RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD); ESC field personnel will at a minimum meet, and when possible exceed, the requirements of this document.

9.3 MEASUREMENT OF WELL WATER LEVEL AND STAGNANT WATER VOLUME CALCULATION

The sampling and analysis plan provides for measurement of standing water levels in each well prior to each sampling event. Field measurements will include depth to standing water surface and total depth of the well. This data will then be utilized to calculate the volume of stagnant water in the well and provide a check on the integrity of the well (e.g., silt buildup). The measurement should be taken to 0.01 foot when possible. A battery powered level sensor will be used to measure depth to the surface of the groundwater. Equipment shall be constructed of inert materials and will be cleaned per sample equipment cleaning procedures prior to use at another well. Field data will be recorded on the Monitoring Well Data Sheet (Figure 2).

9.3.1 Procedure For Water Level Measurement

1. Clear debris from area around well (lay plastic sheathing around well pad as an option).
2. Remove protective casing lid.
3. Open monitoring well lid.
4. Lower the clean water level indicator probe down into the well. A beep will sound upon contact with the water surface. False readings can be made from the wetted side of the well so it will be necessary to check the level several times until a consistent reading is achieved. Record the distance (to the nearest 0.01 ft.) from the top of the well casing to the water surface on the Monitoring Well Data Sheet.
5. Continue to lower the probe until it reaches the well bottom. Record the distance (to the nearest 0.01 ft) from the top of the well casing to the bottom of the well on the Monitoring Well Data Sheet.
6. All water level and well depth measurements shall be made from the top of the well casing unless specified otherwise by the project manager or DER.
7. The wetted depth is obtained by subtracting total well depth from the surface level depth.

9.3.2 Calculating Water Volume

Total volume of standing water in a well is calculated by the following formula:

$$V = \pi r^2 h \times 7.48 \text{ gallons/ft}^3$$

where;

V	=	volume of standing water in the well (gallons)
r	=	radius of well (ft)
h	=	depth of water column in the well (ft)
π	=	3.14
7.48	=	conversion factor

9.4 WELL EVACUATION: WELLS WITHOUT IN-PLACE PLUMBING

Water standing in a well may not be representative of actual groundwater conditions. The standing water in a well should be removed to allow representative formation water to supplant the stagnant water. The evacuation method depends on the hydraulic characteristics of the well but the following general rules apply.

The total amount of water purged must be recorded. Therefore, the volume must be measured during the purging operation. This may be determined by:

1. Collecting the water in a graduated or known volume container (i.e., bucket);
2. Calculate the volume based on the pump rate; however pump rate may not be constant and field personnel should be aware of this;
3. Record the time that the actual purging begins in the field record.

Purging is considered complete if any one of the following criteria is satisfied:

1. Three well volumes are purged and field parameters (pH, temperature, conductivity) stabilize within 5% in consecutive readings at least 5 minutes apart. If field parameters have not stabilized after 5 well volumes, the purging is considered complete and sampling can begin.
2. Five well volumes are purged with no monitoring of field parameters.
3. At least one fully dry purge. A second dry purge may be necessary in some situations.

FIGURE 2
MONITORING WELL DATA SHEET

Site location:

ESC Project name/#:

Well Number	Depth to water surface (ft)	Depth to bottom of well (ft)	Length of water column (ft)	Volume of water evacuated (gal)	Time/date

Well Number	Temperature (^{0}F)	pH (S.U.)	Conductivity (Tmho/cm)	Time/Date

Well casing material / diameter:

Sampled by / signature:

NOTES / CALCULATIONS:

Except for low recovery wells, all wells shall be sampled within 6 hours of purging. Low recovery wells may be sampled as soon as sufficient sample matrix is available or up to 10 hours after purging. Wells that do not recover sufficiently within 10 hours should not be sampled.

Purging equipment includes Teflon® or stainless steel bailers or a peristaltic pump. Any fuel-powered pumping units shall be placed downwind of any sampling site. If purging equipment is reused, it shall be cleaned following standard procedures. Disposable latex gloves shall be worn by sampling personnel and changed prior to starting work at each sampling site.

If bailed water is determined to be hazardous, it should be disposed of in an appropriate manner.

The Florida Department of Environmental Regulation requires that during purging of the well, the purging device should be placed just below the surface of the water level and be lowered with the falling water level. For high yield wells, three casing volumes should be evacuated prior to collecting samples. Purging should be conducted at a rate to minimize agitation of the recharge water. Conductivity, pH, and temperature measurement during purging is necessary to monitor variability of the groundwater. **Samples should be collected within 6 hours of purging high yield wells.**

Low-yield wells (incapable of yielding three casing volumes) should be evacuated to dryness at a rate that does not cause turbulence. When the well recovers sufficiently, the first sample should be analyzed for pH, temperature, and conductivity. When recovery exceeds two hours, the sample should be collected as soon as sufficient volume is available. **If recovery is longer than 10 hours, the well should not be tested**. The project manager may wish to review available information to determine if obtaining a representative sample is possible.

9.4.1 Procedure for Well Evacuation: Teflon® Bailer

1. Clear the area around the well pad; cover with plastic if necessary.
2. Slowly lower the bailer to the water surface and remove it when full.
3. Reel or pull bailer to the surface using caution to not allow the lanyard (cable or string) to touch the ground.
4. Use the bailer volume and number of bails removed to determine volume of water removed. Excess hazardous material should be poured into a container for later disposal.
5. Repeat steps 2 and 3 until 1.5 well volumes have been removed.
6. Begin monitoring for pH, temperature, and conductivity. Record on Monitoring Well Data Sheet. Discard the sample into the collection pail. Purge until the change between samples of each parameter is less than 5 percent.
7. Continue until at least three well volumes have been evacuated and the parameters pH, temperature, and conductivity are within 5 percent, or until a low yield well has been evacuated to dryness.
8. Record date and time the well was purged on the Monitoring Well Data Sheet.

NOTE: For wells sampled in the State of Florida, three well volumes will be purged prior to pH, temperature, and conductivity screening. Following evacuation of three well volumes, purge water will be screened for these parameters at regular intervals until two consecutive measurements are within 5 percent. The intervals may be time-based (at least 5 min) or represent a portion of the well volume (at least 0.5 well volume)

Compliance with more stringent local, State, or Regional guidelines will be maintained where required.

9.4.2 Procedure for Well Evacuation: Peristaltic Pump

1. Clean area around the well pad.
2. Install the appropriate length of Tygon® or Teflon® tubing into the pump mechanism.
3. Insert the uncontaminated sampling end of the tubing into the well surface.
4. Connect the pump to the power supply.
5. Operate the pump at a flow rate that does not cause excessive agitation of the replacement water.
6. Determine the pump flow rate.
7. Purge until 1.5 well volumes have been evacuated.
8. Collect samples at a rate of one per well volume evacuated. Monitor these samples for pH, temperature, and conductivity. Record these measurements on the Monitoring Well Data Sheet. Monitor until the difference in each parameter is less than 5 percent.
9. Continue purging until three well volumes have been evacuated and the parameters pH, temperature, and conductivity are within 5 percent, or until a low yield well has been evacuated to dryness.
10. Record the date and time the well was purged on the Well Sampling Field Data Sheet.

9.5 PURGING TECHNIQUES: WELLS WITH IN-PLACE PLUMBING

9.5.1 General

The volume to be purged depends on whether the pumps are running continuously or intermittently and how close to the source samples can be collected. If storage/pressure tanks are present, a volume must be purged to totally exchange the volume of water in the tank.

9.5.2 Continuously Running Pumps

For continuously running pumps, the well should be purged by opening the valve and allowing it to flush for 15 minutes, if the well volume is unknown. If the sample is collected after a holding tank, the volume of the tank should also be purged.

9.5.3 Intermittently Running Pumps

Wells shall be purged at the maximum rate for at least 15 minutes. Monitoring of field parameters will continue until two consecutive measurements within 5% are measured at 5-minute intervals.

9.6 SAMPLE WITHDRAWAL

Technique for withdrawal is dependent on the parameters to be analyzed. To collect a representative sample and minimize the possibility of sample contamination:

- Use Teflon® or stainless steel sampling devices when organics are an analyte of concern.
- Use dedicated tubing or samplers for each well. If a dedicated sampler is not available, clean the sampler between sampling events. Analyze equipment blanks to ensure cross-contamination has not occurred.

The preferred sample collection order is as follows (decreasing volatility):

1. Volatile organic compounds (VOCs)
2. Extractable Organics (includes Total Recoverable Petroleum Hydrocarbons [TRPH], Oil & Grease, Pesticides and Herbicides)
3. Total metals
4. Dissolved metals
5. Microbiological
6. Inorganics (includes Nutrients, demands, and Physical Properties)
7. Radionuclides

The following items are acceptable sampling devices for all parameters:

- A gas-operated, Teflon® or stainless steel squeeze pump (also referred to as a bladder pump with adjustable flow control) should be dedicated or completely cleaned between sampling events. If it is dedicated, the protocols on use, flow rates, and flow controls should be discussed.
- A Teflon® bailer with check valves and a bottom emptying device. Dedicated or disposable bailers should not be cleaned between purging and sampling operations.

ESC generally supplies sampling devices for wells sampled by ESC. However, some clients have wells equipped with dedicated sampling devices. All dedicated equipment will be cleaned between sampling events with the exception of dedicated pump systems or dedicated pipes that are never removed. ESC will evaluate the device and the project manager shall approve/disapprove of the dedicated device prior to sampling.

If sampling includes dissolved parameters, samples shall be filtered in the field in the following manner:

1. Use a one piece, molded, in-line high capacity disposable 1.0 micron filter when collecting samples for dissolved trace metals analysis. Use a 0.45 micron filter when sampling for all other (i.e., orthophosphorous, silica, etc.) dissolved parameters.
2. Filter material should be non-contaminating synthetic fibers.
3. Filter should be placed on the positive pressure side of the peristaltic pump.
4. If well is deeper than 25 feet; a submersible bladder pump may be necessary to bring the sample to the surface. Samples shall not be collected in an intermediate container.
5. At least one filtered equipment blank using deionized water must be collected and analyzed.
6. The sample shall be preserved as required following filtration.
7. Unfiltered samples will be collected in conjunction with filtered samples.

NOTE: Filtered samples will be collected only at the request of DER and will not be collected for turbid samples only.

9.6.1 Sample Removal: With In-Place Plumbing

Samples should be collected following purging from a valve or tap as near to the well as possible, and ahead of all screens, aerators, filters, etc. Samples shall be collected directly into the sampling containers. Flow rate should not exceed 500 mL/min.

9.6.2 Sample Removal: Without In-Place Plumbing

1. Following purging, collect the sample and pour it directly from the bailer into the sample container. If a peristaltic pump is used, pump the sample directly into the container. Collect the samples in order of decreasing volatility.
2. Measure the conductivity, pH, and temperature of the samples and record the results on the Monitoring Well Data Sheet.
3. If a bailer is not dedicated, clean field equipment using standard procedures. Collect blanks at a rate of one per type of equipment cleaned. If a piece of equipment is cleaned more than twenty times, collect blanks at a rate of 10 percent. An equipment blank must be taken and preserved for each analyte method group.
4. If a bailer is used to collect samples, replace the bailer string. Take precautions not to allow the string to touch the ground. Dispose of the used string properly. If Teflon® or stainless steel cable is used, clean according to standard procedures and do not let it touch the ground.
5. Replace the well cap and close and lock the protective casing lid.

9.7 SPLIT AND DUPLICATE SAMPLE COLLECTION

Split samples measure variability between analysts, methods, and laboratories and are taken as subsamples from a single sample. Duplicate samples measure variability inherent in the collection method or waste stream and are obtained in close succession during the same sampling event.

9.7.1 Split Sample Collection

1. Collect sufficient volume in a container constructed of appropriate materials. The volume should be more than twice the volume required for one sample.
2. Preserve as necessary.
3. Mix well.
4. Alternately decant 10% of the sample volume into each container and mix well.
5. Continue until each container is filled with an adequate sample volume.
6. Seal the containers, assign a field number, and complete the chain of custody.

9.7.2 Duplicate Sample Collection

1. Collect two samples in rapid succession into separate containers.
2. Preserve as necessary.
3. Mix well.
4. Seal the containers, assign a field number, and complete the chain of custody.

9.8 DRINKING WATER SAMPLING

9.8.1 General Concerns

Containers and preservatives must be selected prior to sampling.

- Containers and preservatives shall comply with Tables 1 and 2.
- It is recommended that the appropriate preservative be added to the container by the laboratory.

9.8.2 Sampling Drinking Water Wells

1. Purging and sampling should be from a spigot closest to the wellhead.
   - The spigot should be located before the holding tank and filters. If this is not possible, the holding tank must also be purged.
   - All aerators and filters should be removed if possible.
2. Depending on the running schedule of the well and the placement of the pressure tank, the system will be purged as described in Section 9.5.
3. If volume of the pressure tank is not known, the well is purged for at least 15 minutes at maximum rate.
4. The flow is reduced to approximately 500 mL/minute.
5. Sample containers with no preservatives:
   - The interior of the cap or the container should not come in contact with anything.
   - The sample container is rinsed and the water is discarded.
   - Containers are not rinsed if collecting for oil and grease, total recoverable hydrocarbons, volatile organics (including trihalomethanes) or microbiologicals.
   - The container should be tilted to minimize agitation.
6. Sample containers with preservatives:
   - The above protocol is followed but **DO NOT** rinse the container.
   - The open end of the container should be held away from the face while filling.
   - The container should be gently tipped several times to mix the preservatives.
7. Place the bottle in a plastic bag and cool to 4°C.

9.8.3 Sampling Drinking Water Within A Facility/Residence for the Lead/Copper Rule

1. The appropriate sampling point depends on whether the sample is being taken to monitor compliance with Drinking Water Regulations for Lead and Copper. If so, the sample must be taken from a cold water tap in the kitchen or bathroom of residential housing or from an interior tap where water is used for consumption in a non-residential building.
2. Samples must be collected after the water has stood in the pipes for at least six hours.
3. THE SYSTEM SHOULD NOT BE FLUSHED.
4. The first flush should be collected immediately into the sample container. DO NOT RINSE THE CONTAINER PRIOR TO COLLECTING THE SAMPLE.
5. The container should be tilted to minimize agitation.
6. If the container contains preservative, hold the open end away from the face.
7. Add preservative as needed.
8. Replace cap and gently tip the container several times to mix the preservatives.
9. Place in a plastic sample bag.

9.8.4 Sampling a Lead Service Line in a Facility/Residence for the Lead/Copper Rule

1. When sampling for compliance, the sampling point is normally designated by the permit or the municipality.
2. For Lead & Copper samples, each sample shall have stood in the line for at least six hours and shall be collected in one of the following ways:
   a. At the tap, after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based upon the inner diameter and length of the pipe between the tap and the service line.
   b. By tapping directly into the service line.
   c. In a single-family residence, allow the water to run until a significant temperature change indicates water standing in the service line is being sampled.
3. The flow shall be reduced to less than 500 mL/min before collecting samples.
4. Test for the presence of residual chlorine using residual chlorine indicator strips or a Hach DR-100 chlorine analyzer.
5. If residual chlorine is present and the parameter being analyzed requires removal of chlorine, collect the sample in the appropriate sample container(s) using the required preservatives.
   a. Add 0.008% $Na_2S_2O_3$ or 100mg of $Na_2S_2O_3$ per 1L of sample water directly into the sample container.
   b. After replacing the cap, tip the container several times to mix the preservative.

10.0 SOIL SAMPLING

Soil samples are preserved as per Section 14. When compositing subsamples, the quantity of each subsample used shall be measured and recorded in the field logbook.

10.1 SAMPLING EQUIPMENT

Type	Use	Materials	Allowable Parameter Groups[1]
Hand Auger (Bucket type)	Sampling	PVC	All parameter groups except VOC's, extractables and organics
Encore™ Sampler	VOC soil subsampling	Teflon®	VOC's only
Split Spoons	Sampling	Carbon Steel	All parameter groups
Trowel, Spatula	Sampling and Compositing*	Chrome-Plated Steel	All parameter groups
Spoons	Sampling and Compositing*	Stainless Steel	All parameter groups
Shovel	Sampling	Carbon Steel	All parameter groups
Mixing Pan	Compositing*	Pyrex & Aluminum	All parameter groups except metals in aluminum pan

[1] Carbon steel & Chrome-plated steel tools may be used for collecting soils where trace metal concentrations are not a concern. When these tools are used, samples should be taken from soils not in contact with the tool surface.

***** Compositing is not suitable for VOC's

10.2 HAND AUGER SAMPLING PROCEDURE

This procedure is used when only relatively shallow samples are required or when the use of heavy equipment is not practical. The hand auger may be used to collect samples of soils or other materials at various depths by adding extensions as necessary.

1. Remove surface debris from the location of the sampling hole using a clean shovel or spoon.
2. Disturbed portions of soil should be discarded and not taken as part of the sample.
3. Using a clean auger, drill to the desired sample depth. Confirm depths using a tape measure or other appropriate device.
4. Use a clean planer auger to clean and level the bottom of the boring.
5. All grab samples should be mixed thoroughly prior to placement in containers (except VOCs).

6. Using a clean auger, extract the desired sample. Subsampling is performed for VOC sample collection using an Encore™ sampling device. Once the core sample is collected, additional samples should be taken using an Encore™ sampler, either 5g or 25g, capped, sealed, and immediately cooled to 4ºC. The holding time for this method is 48 hours. Alternatively, weigh 5g of sample into a pre-weighed vial (with a Teflon® lined screw cap) containing 5mL sodium bisulfate solution and a magnetic stir bar, cap, and then ice to 4ºC. The holding time for this method is 14 days.
7. If less than the collected volume of material is desired or if multiple containers are required, subsampling shall be conducted. The collected material shall be placed in a clean mixing pan and thoroughly mixed using a clean, stainless steel spoon. The mixed material will then be quartered, removed and recombined before samples are collected. For clay soils, representative aliquots of the entire sample should be removed from the auger using stainless steel spoons. Samples for chemical analyses shall not be collected from auger flights or cuttings from hollow stem auger flights. Samples used for vapor meter determinations will not be used for trace contaminant analyses.
8. Samples should then be labeled. The depth range from which the samples were taken should be included in the sample description.
9. Repeat steps (2) through (6) as necessary to obtain samples at all desired depths.
10. When preparing composite samples, the quantity of each subsample shall be measured and recorded in the field logbook.

10.3 SPLIT AND DUPLICATE SAMPLE COLLECTION

Split samples measure variability between analysts, methods, and laboratories and are taken as subsamples from a single sample. This is unlike duplicate samples that measure variability inherent in the collection method or waste stream and are obtained in close succession during the same sampling event. True split samples are difficult to collect for soils, sediment, and sludge under field conditions. Split samples for these materials are therefore considered duplicate samples.

The collection procedure is as follows:

1. Collect the appropriate volume of sample into a clean disk constructed of a non-reactive material.
2. Mix the material with a clean utensil and separate into 4 to 10 equal portions.
3. Alternate placing a portion of the subdivided material into each container.
4. Repeat until each container is filled.
5. Assign each container a field sample number and complete the chain of custody.

11.0 WASTE SAMPLING

11.1 SAMPLING EQUIPMENT

Type	Use	Materials	Allowable Parameter Groups[1]
Shovel	Sampling	Carbon Steel	All parameter groups except metals
Split Spoons	Sampling	Carbon Steel	All parameter groups except metals
Trowel, Spatula	Sampling and Compositing*	Stainless Steel	All parameter groups
Spoon	Sampling and Compositing*	Stainless Steel	All parameter groups
Drum Pump	Sampling	Polypropylene	All parameter groups
Mixing pan	Compositing*	Pyrex or aluminum	All parameter groups except metals in aluminum pan
Coliwasa	Sampling	Glass	All parameter groups

[1]Carbon steel tools may be used for collecting wastes when trace metal concentrations are not a concern.
*Compositing is not suitable for VOC's

11.2 GENERAL

This section discusses the collection of samples from drums, tank trucks, and storage tanks, and samples from waste piles and landfills. All ESC personnel consider sampling from closed containers as a hazardous operation.

11.2.1 Specific Quality Control Procedures for Sampling Equipment

Sampling equipment used during waste sampling must be cleaned as specified in Section 12 of this manual before being returned from the field to minimize contamination.

Contaminated disposable equipment must be disposed of as specified in the sampling plan.

All field equipment shall be cleaned and repaired before being stored at the conclusion of a field study. Special decontamination procedures may be necessary in some instances and will be developed on a case-by-case basis. Any deviation from standard cleaning procedures and all field repairs shall be documented in field logbooks. Equipment that has not been properly cleaned must be tagged and labeled.

11.2.2 Collection of Supplementary Information

The collection of supplementary data is important when collecting waste samples. Any field analyses shall be recorded in field logbooks. Sketches of sampling locations and layout shall be documented in the logbooks. Photographs shall be used extensively.

11.3 OPEN AND CLOSED CONTAINER SAMPLING

11.3.1 General

When sampling containers, open containers should be sampled first since they generally present less of a hazard. Closed containers must be considered as extremely hazardous. Due to the dangers involved with container sampling, the sampling of drums or other containers containing either unknown materials or known hazardous materials shall be considered a hazardous duty assignment.

One problem with container sampling is stratification and/or phase separation. Care must be taken to ensure that the sample collected is representative. If only one layer or phase is sampled, this should be noted when interpreting analytical results.

If no stratification is present, representative samples may be composited by depth. When a drum or cylindrical container is standing vertically, depth compositing provides a good quantitative estimate of the containers contents. In other cases where containers are tipped, horizontal, deformed, etc., and stratification may not be present, vertical compositing will at least provide a qualitative sample.

11.3.2 Sampling Equipment

The following equipment is available for use in collecting waste samples: barrel bung wrenches, adjustable wrenches, etc.; coliwasa samplers for drum sampling; and peristaltic pumps for liquid waste sampling from containers.

11.3.3 Sampling Techniques

Containers containing unknown materials or known hazardous materials shall be opened using only spark proof opening devices from a grounded container.

The coliwasa sampler is a single use glass sampler, consisting of an outer glass tube with one end tapered and a separate inner glass tube with a small bulb on one end. The outer tube is slowly lowered into the drum, tapered end first. Slowly lowering the tube allows the liquid phases in the drum to remain in equilibrium. The inner glass tube is inserted into the outer tube. After both inner and outer tubes are inserted into the drum to be sampled, the inner tube bulb end is pressed gently against the tapered end of the outer tube, forming a seal. Both tubes are withdrawn from the drum and the ends of the tubes are held over the sample container.

Drum samples can also be collected using a length of glass tube (1/2-inch or less inside diameter). The tube is inserted into the drum as far as possible and the open end is sealed to hold the sample in the tube. The sample is then placed in the appropriate container. Sample volumes shall be the absolute minimum required.

Tank truck and storage tank samples may be collected from access ports on top of these tanks or trucks using the above techniques. Tank trucks are often compartment-alized, and each compartment should be sampled. Sampling from discharge valves is not recommended due to stratification possibilities and possibilities of sticking or broken valves. If the investigator must sample from a discharge valve, the valving arrangement of the particular tank truck being sampled must be clearly understood to ensure that the contents of the compartments of interest are sampled. The investigator must realize that samples obtained from valves may not be representative.

If stratification or phase separation of waste samples is suspected, the sample collected should be representative of container contents. Samples should be depth composited when possible and number and types of layers shall be noted when interpreting analytical results.

11.4 WASTE PILES AND LANDFILLS

11.4.1 General

Waste piles consist of sludge and other solid waste, liquid waste mixed with soil, slag, or any type of waste mixed with construction debris, household garbage, etc. The sampling personnel must be aware that landfills were not and are often still not selective in the types of materials accepted. Sampling at landfills could involve sampling operations that are potentially dangerous to sampling personnel.

11.4.2 Sampling Locations

Sampling locations should be selected that will yield a representative sample of the waste. Exceptions are situations in which representative samples cannot be collected safely or when the team is purposely determining worst-case scenarios.

11.4.2.1 Waste Piles

A representative sample from a small waste pile can be obtained by collecting a single sample. Collecting representative samples from large waste piles requires a statistical approach in selecting both the numbers of samples and sample location. A discussion of statistical methods is outlined in the Test Methods for Evaluating Solid Waste (SW-846) issued by the EPA Office of Solid Waste and Emergency Response.

11.4.2.2 Landfills

Representative samples from landfills are difficult to achieve to due to the heterogeneous nature of the wastes. A statistical approach should be used in selecting both the number of samples and the sample location. Statistical methods are given in Test Methods for Evaluating Solid Waste (SW-846) issued by the EPA Office of Solid Waste and Emergency Response. Landfills often generate leachate at one or more locations downgradient of the fill material that can provide some insight into the materials contained in a landfill that are migrating via groundwater.

11.4.3 Sampling Techniques

All samples collected should be placed into a Pyrex® or aluminum mixing pan and mixed thoroughly. Samples for volatile organic compounds analyses must not be mixed or composited. Stainless steel spoons or scoops should be used to clear away surface materials before samples are collected. Near surface samples can then be collected with a clean stainless steel spoon. Depth samples can be collected by digging to the desired depth with a carbon steel shovel or scoop and removing the sample with a stainless steel spoon.

12.0 STANDARD CLEANING PROCEDURES

12.1 GENERAL

12.1.1 Introduction

ESC personnel use the procedures outlined in this section to clean field equipment prior to use. Ideally, a sufficient amount of clean equipment is carried to the field so that the project can be conducted without the need for field cleaning. This is not always the case. ESC's policy regarding cleaning field equipment is as follows:

1. Equipment used in the field must be thoroughly cleaned in a controlled environment using prescribed procedures. This minimizes the potential for contaminants being transferred to equipment, vehicles, and the laboratory.
2. All equipment will be rinsed immediately with tap water after use, even if it is to be field cleaned for other sites.
3. If equipment is used only once (i.e., not cleaned in the field), it will be labeled as “dirty” or “contaminated equipment” in the field and transported separately from clean equipment.
4. All cleaning procedures shall be documented. Field decontamination shall be documented in the field records. These records will specify the type of equipment cleaned and the specific protocols that are used. In-house cleaning records must identify the type of equipment, date it was cleaned, SOP used, and person that cleaned it.
5. Unless justified through documentation (i.e., company written protocols and analytical records) and historic data (i.e., absence of analytes of interest in equipment blanks), the protocols in Sections 12.1.2 through 12.7.11 shall be followed without modification.
6. All field sampling equipment shall be pre-cleaned in-house.

12.1.2 Cleaning Materials

Use a phosphate-free, laboratory detergent such as Liquinox®. The use of any other detergent is noted in field logbooks and summary reports.

Ten percent nitric acid solution shall be made from reagent-grade nitric acid and deionized water.

The standard cleaning solvent used will be pesticide-grade isopropanol. Other solvents (acetone and/or hexane) may be substituted as necessary. The use of other solvents must be documented in field logbooks and summary reports.

Tap water may be used from any potable water system. Untreated water is not an acceptable substitute for tap water.

Deionized water is tap water that has been passed through a deionizing resin column and should contain no inorganic compounds at or above analytical detection limits. Organic-free water is tap water that has been de-ionized and treated with activated carbon. Organic-free water should contain no detectable levels of organic compounds, and less than 5 ug/L of VOCs.

Analyte-free water is water in which all the analytes of interest and all interferences are below the method detection limits. Analyte-free water is always used for blank preparation and for the final in-house decontamination rinse.

Substitution of a higher grade water (i.e., deionized or organic-free water for tap water) is permitted and need not be recorded. Solvent, nitric acid, detergent, and rinse water used to clean equipment shall not be reused.

12.1.3 Marking Clean Equipment

Equipment that is cleaned by these methods shall be marked with the date and time that the equipment was cleaned.

12.1.4 Marking Contaminated or Damaged Field Equipment

Field equipment that needs repair will be tagged and repairs or symptoms noted on the tag. Field equipment that needs cleaning **will not** be stored with clean equipment. All wrapped equipment not used in the field may be placed back in stock after equipment is inspected to ensure that contamination has not taken place.

12.1.5 Decontamination of Equipment Used With Toxic or Hazardous Waste

Equipment used to collect hazardous or toxic wastes or materials from hazardous waste sites, RCRA facilities, or in-process waste streams shall be decontaminated prior to leaving the site. This decontamination procedure shall consist of washing with laboratory detergent and rinsing with tap water. More stringent procedures may be required depending on the waste sampled.

If equipment is heavily contaminated, an acetone or acetone/hexane/acetone pre-rinse may be necessary prior to regular decontamination procedures. It is not recommended that this type of cleaning be performed in the field.

12.1.6 Disposal of Cleaning Materials

See Section 16.

12.1.7 Safety Procedures For Cleaning Operations

All applicable safety procedures shall be followed during cleaning operations. The following precautions shall be taken during cleaning operations:

- Safety glasses or goggles, gloves, and protective clothing will be worn during all cleaning operations.
- Solvent rinsing operations will be conducted under a hood or in an open, well ventilated area.
- No eating, smoking, drinking, chewing, or hand to mouth contact shall be permitted during cleaning operations.

12.1.8 Storage of Field Equipment

All clean field equipment shall be stored in a designated, contaminant-free area.

12.2 QUALITY CONTROL PROCEDURES FOR CLEANING

12.2.1 General

This section establishes quality control methods to monitor the effectiveness of the equipment cleaning procedures. The results of these methods will be monitored by the ESC Quality Assurance Department. All quality control procedures are recorded in a logbook and maintained in a quality assurance file. If contamination problems are detected, the ESC QA Department shall determine the cause(s) of the problem(s) and take immediate corrective action.

12.2.2 Rinse Water

The quality of water used shall be monitored once per quarter by placing water in standard, precleaned sample containers and submitting them to the ESC laboratory for analysis. Organic-free water will also be submitted for analyses of the various organic compounds.

12.3 PROCEDURES FOR CLEANING TEFLON® OR GLASS EQUIPMENT USED IN THE COLLECTION OF SAMPLES FOR TRACE ORGANIC COMPOUNDS AND/OR METALS ANALYSES

1. Equipment will be washed with laboratory detergent and hot water using a brush to remove any particulate matter or surface film. If oil, grease, or other hard to remove residues are present on the equipment, an acetone/hexane/acetone pre-wash and/or steam cleaning may be necessary.
2. Rinse the equipment with hot tap water.
3. Rinse or soak, if necessary, equipment with a 10% nitric acid solution. If nitrogen-containing compounds are analytes of concern, hydrochloric acid must be used as a substitute or subsequent equipment rinse.
4. Rinse equipment with tap water.
5. Rinse equipment with deionized water.
6. Rinse equipment twice with solvent and allow to dry.
7. If equipment cannot be cleaned effectively, discard properly.
8. Wrap equipment in aluminum foil. Seal in plastic and date.

12.4 PROCEDURES FOR CLEANING STAINLESS STEEL OR METAL SAMPLING EQUIPMENT USED IN TRACE ORGANIC AND/OR METALS SAMPLE COLLECTION

1. Equipment will be washed with laboratory detergent and hot water using a brush to remove any particulate matter or surface film. If oil, grease, or other hard to remove materials are present, a acetone/hexane/acetone pre-wash and/or steam cleaning may be necessary.
2. Rinse equipment with hot tap water.
3. Rinse equipment with deionized water.
4. Rinse equipment twice with solvent and allow to dry.
5. If equipment cannot be cleaned effectively, discard properly.
6. Wrap equipment in aluminum foil. Seal in plastic and date.

12.5 CLEANING PROCEDURES FOR AUTOMATIC SAMPLING EQUIPMENT

12.5.1 General

All automatic wastewater samplers will be cleaned as follows:

- The exterior and accessible interior portions of automatic samplers will be washed with Liquinox and rinsed with tap water.
- The electronics casing will be cleaned with a clean damp cloth.
- All vinyl sample tubing will be discarded after each use.
- Teflon® tubing will be cleaned using procedures found in Section 12.6.2.
- Silastic pump tubing will be cleaned and re-used after each use, if possible. Tubing will be cleaned using cleaning procedures specified in Section 12.6.1 of this document. Tubing shall be checked on a regular basis and will be changed if it has become discolored or loses elasticity.

12.5.2 Reusable Glass Composite Sample Containers

1. If containers are used to collect samples that contain hard to remove materials (i.e., oil and grease) it is rinsed as necessary with reagent grade acetone prior to the detergent wash. If material cannot be removed, the container is discarded.
2. Wash containers thoroughly with hot tap water and Liquinox and rinse thoroughly with hot tap water.
3. If metals are to be sampled, rinse with 10% nitric acid. If nutrients are to be sampled, follow with a 10% hydrochloric acid rinse.
4. Rinse thoroughly with tap water.
5. Rinse thoroughly with DI water.
6. If organics are to be sampled, rinse twice with isopropanol and allow to air dry for 24 hours or more. Cap the container with the decontaminated Teflon® lined lid.
7. After use rinse with tap water in the field and cover to prevent drying of material onto the interior surface.
8. Containers that have a visible scale, film, or discoloration after cleaning or were used at a chemical manufacturing facility should be properly discarded at the conclusion of the sampling activities.

12.5.3 Reusable Plastic Composite Sample Containers

1. Wash containers with hot tap water and laboratory detergent using a bottlebrush to remove particulate matter and surface film.
2. Rinse containers with hot tap water.
3. Rinse containers with 10% nitric acid. If nitrogen containing compounds are analytes of concern, hydrochloric acid must be used as a substitute or subsequent equipment rinse.
4. Rinse containers with tap water.
5. Rinse containers with deionized water.
6. Cap with aluminum foil.
7. Plastic sample containers used at facilities that produce toxic compounds will be properly disposed of at the conclusion of the sampling activities. Containers that have a visible film, scale, or other discoloration remaining after cleaning will be discarded.

12.5.4 Plastic Sequential Sample Bottles for Automatic Sampler Base

1. Rinse bottles in field with potable or de-ionized water when possible.
2. Wash in dishwasher at wash cycle, using laboratory detergent cycle, followed by tap and deionized water rinse cycles. Alternatively, hand wash using the same procedure.
3. Rinse with 10% nitric acid. If nitrogen containing compounds are analytes of concern, hydrochloric acid must be used as a substitute or subsequent equipment rinse.
4. Rinse with tap water.
5. Replace bottles in sampler base; cover with aluminum foil before storing.

12.6 CLEANING PROCEDURES FOR SAMPLING TUBING

12.6.1 Silastic Rubber Pump Tubing Used In Automatic Samplers

Silastic pump tubing used in automatic samplers need not be replaced in pumps where the sample does not contact the tubing, where the sampler is being used solely for purging purposes (i.e., not being used to collect samples). Tubing must be changed on a regular basis, if used for sampling purposes, and should be cleaned in this manner:

1. Flush tubing with laboratory grade detergent and hot tap water
2. Rinse thoroughly with hot tap water
3. Rinse thoroughly with DI water
4. If used to collect metals samples, the tubing shall be flushed with 1+5 nitric acid, followed by a thorough rinsing with DI water
5. Install the tubing in the automatic wastewater sampler
6. Cap both ends with aluminum foil or equivalent

Tubing should always be replaced at automatic sampler manufacturer's recommended frequencies. If tubing cannot be adequately cleaned, it shall be discarded.

12.6.2 Teflon® Tubing

New Teflon® tubing shall be pre-cleaned as follows:

1. Rinse outside of the tubing with pesticide-grade solvent.
2. Flush interior of the tubing with pesticide-grade solvent.
3. Let dry overnight in drying oven or equivalent.
4. Wrap tubing in aluminum foil and seal in plastic.

Reused tubing shall be transported to the field in pre-cut and pre-cleaned sections. Field cleaning of Teflon® is not recommended. The following steps describe in-house cleaning procedures:

1. Exterior of tubing must be cleaned first by soaking in hot, soapy water in a stainless steel or non-contaminating sink. Particulate may be removed with a brush.
2. Clean inside of tubing ends with a small bottlebrush.
3. Rinse surfaces and ends with tap water.
4. Rinse surfaces and ends with nitric acid, tap water, isopropanol, and analyte-free water.
5. Place on fresh aluminum foil, connect all sections with Teflon® couplings.

6. Cleaning configuration:
   a. Cleaning solutions are placed in a clean, 2-liter glass jar.
   b. Place one end of tubing in the solution, the other in the **INFLUENT** end of a peristaltic pump.
   c. Effluent from the pump can be recycled through the glass cleaning solution jar. All cleaning solutions can be recycled EXCEPT the final isopropanol and analyte-free water rinses.
7. The above configuration is used as follows:
   a. Pump generous amounts of hot, soapy water through the tubing.
   b. Follow this with tap water, 10% nitric acid, tap water, isopropanol, and analyte-free water.
   c. The nitric acid and isopropanol rinses should be allowed to remain in the tubing for 15 minutes with the pump shut off then continue with subsequent rinses
   d. Leave any couplings in and connect or cover the remaining ends.
8. After cleaning the interior, rinse the exterior with analyte-free water.
9. The cleaned lengths are wrapped in aluminum foil and stored in a clean, dry area until use.

12.7 FIELD EQUIPMENT CLEANING PROCEDURES

12.7.1 General

It is the responsibility of field personnel to properly clean equipment in the field. The following procedures shall be observed when cleaning equipment in the field.

12.7.2 Conventional Equipment Use

Remove deposits with a brush if necessary. If only inorganic anions are of interest, equipment should be rinsed with analyte-free water and with the sample at the next sampling location prior to collection. Clean equipment for the collection of samples for organic compounds or trace inorganic analyses according to Section 12.7.3.

12.7.3 Equipment Used to Collect Organic Compounds and Trace Metals Samples

1. Clean with tap water and laboratory detergent. If necessary, use a brush to remove particulate and surface films then rinse with tap water.
2. Rinse with 10 to 15% nitric acid solution followed by 10% hydrochloric acid rinse (unless equipment is made of metal) followed by tap water and DI water.
3. Rinse twice with solvent.
4. Rinse with organic-free water and allow to air dry.
5. If organic-free water is unavailable, let air dry. Do not rinse with deionized or distilled water.
6. Wrap with aluminum foil or plastic.

12.7.4 Teflon®, Glass, Stainless Steel or Metal Equipment Used to Collect Samples for Metal Analyses

1. Remove particulate matter and surface films. Clean with laboratory detergent and tap water.
2. Rinse with tap water.
3. Ten percent nitric acid solution (skip 3 and 4 if equipment is made of metal and/or stainless steel).
4. Rinse with tap water.
5. Rinse with deionized water then let air dry.

12.7.5 Instruments Used to Measure Groundwater Levels

1. Wash with laboratory detergent and tap water.
2. Rinse with tap water.
3. Rinse with deionized water.
4. Allow to dry.

12.7.6 Field Filtration Apparatus

1. A new, disposable filtration unit will be used for each site. Filter pore size will be dependent on parameter being monitored as per Section 9.6.
2. The peristaltic pump is cleaned as described in Section 12.7.7.
3. Silastic pump tubing will be cleaned as described in Section 12.6.1.
4. If Teflon® tubing is used, it will be cleaned as described in Section 12.6.2.
5. Other tubing types must be cleaned following the appropriate regimen described in Section 12.6. In general, non-Teflon® type tubing (e.g., HDPE) will not be re-used.

12.7.7 Flow Meters, Above Ground Pumps, Bladder Pumps and Other Field Instrumentation

The exterior of equipment such as flow meters should be washed with a mild detergent and rinsed with tap water before storage. The interior of such equipment may be wiped with a damp cloth.

Other field instrumentation should be wiped with a clean, damp cloth. Meter probes should be rinsed with deionized water before storage.

Equipment desiccant should be checked and replaced as necessary.

Peristaltic pumps used for purging must be free of oil and grease on the exterior. They must be cleaned on the outside with Liquinox and rinsed with tap water followed by DI water.

12.7.8 In-Field Decontamination For Submersible Purging Pump and Tubing

ESC uses the submersible bladder pump listed in Section 9.1 only for purging and not for sample collection. The pump and tubing shall be decontaminated between wells in the following manner:

1. Interior of the pump and tubing shall be thoroughly flushed with a soapy water solution.
2. Wipe or scrub the exterior of the pump and tubing as necessary with the appropriate soap solution.
3. Rinse exterior and interior of pump and tubing thoroughly with tap water followed by a deionized water rinse.
4. Allow remaining water to drain from tubing and pump and allow to air dry as long as possible in a contaminant free area before purging the next well.

12.7.9 Shipping Containers

All reusable shipping containers shall be washed with laboratory detergent, rinsed with tap water, and air dried before storage or re-use. Extremely contaminated shipping containers shall be cleaned as thoroughly as possible and properly disposed.

12.7.10 Analyte Free Water Containers

Analyte-free water containers can be made of glass, Teflon®, polypropylene, or high density polyethylene (HDPE). Inert glass or Teflon® are recommended for holding organic-free sources of water. Polypropylene can be used when organics are not analytes of concern. HDPE is not normally recommended but is acceptable for use. Water should not be stored in these containers for extended periods. Containers of water should only be used for a single event and should be disposed of at the end of the sampling day. The procedure for cleaning analyte-free water containers is as follows:

1. For new containers, follow instructions in Section 12.3 of this manual. Delete the solvent rinse if containers are made of plastic.
2. Cap with Teflon® film, aluminum foil, or the Teflon® lined bottle cap (aluminum foil or Teflon® film may also be used as a cap liner).

If water is being stored in reused containers, the following cleaning procedures should be followed:

1. After emptying, cap the container.
2. Wash exterior of the container with Liquinox and rinse with DI water.
3. Rinse the interior twice with isopropanol unless the container is made of plastic.
4. Rinse the interior thoroughly with analyte-free water.
5. Invert and allow to dry.
6. Fill the container with analyte-free water and cap with aluminum foil, Teflon® film, or a Teflon® lined bottle cap.
7. Water shall not be stored prior to a sampling event for more than 3 days.

12.7.11 Vehicles

Field vehicles used by ESC personnel should be washed at the conclusion of each sampling event. This should reduce the risk of contamination due to transport on a vehicle. When vehicles are used at hazardous waste sites or on studies where pesticides, herbicides, organic compounds, or other toxic materials are known or suspected to be present, a thorough interior and exterior cleaning is mandatory at the conclusion of the site visit.

Vehicles are equipped with trash containers. ESC personnel are responsible for cleanliness of each vehicle.

13.0 SAMPLE HISTORY

Sample chronology is recorded and kept on the ESC chain of custody, field logbooks and laboratory notebooks. These are discussed in detail in Section 9.0.

14.0 SAMPLE CONTAINERS, PRESERVATION METHODS AND HOLDING TIMES

14.1 GENERAL CONSIDERATIONS

The following section contains information regarding sample containers, preservation methods, and holding times. Refer to SW-846, Table II-1 and Chapter 3, Page 3 for solid waste and RCRA projects and 40 CFR Part 136, Table II for water and wastewater projects.

The provisions of 40 CFR Part 136, Table II shall take precedence over requirements given in any approved method when sampling in the State of Florida for water and wastewater.

Proper sample preservation is the responsibility of the sampling team and it is their responsibility to assure that all samples are preserved according to 40 CFR Part 136. For the purposes of this manual, "immediately" will be defined as within 15 minutes.

Sample preservation is accomplished either by obtaining prepreserved containers from an acceptable source or by adding preservatives in the field.

It is the responsibility of the field team accepting prepreserved containers to make sure that the proper preservatives are used and desired results are achieved. The laboratory shall also supply additional preservatives from the same source in suitable containers.

14.2 SAMPLE PRESERVATION

The following protocols apply for sample containers preserved in the field after the sample has been added:

1. Preservatives shall be at least reagent grade or higher. The acid for metals shall be suitable for trace metals analyses.
2. Fresh preservatives shall be obtained prior to each sampling event. Remaining preservatives that are not sealed must be discarded in an acceptable manner.
3. Preservatives are transported in pre-measured glass ampules and added directly to the sample.
4. A corresponding amount of preservative shall be added to associated equipment blanks.
5. The pH is checked on all pH preserved samples with the exception of VOC, oil and grease, and TRPH.

Effectiveness of pH adjustment is made in the following manner:

1. Narrow range pH paper is used to test a small aliquot of the preserved sample.
2. A small portion of sample is placed into a container, checked with pH paper, and compared against the color chart.
3. Discard the aliquot properly, but do not pour back into the sample container.
4. If pH is acceptable, document in field log and prepare for transport to laboratory.

If pH is unacceptable, continue to add additional preservative in measured increments using the methods described above until an acceptable pH has been reached. Record the total amount of preservative used in the field log. Always use additional preservative from the same source as the initial preservation attempt.

In some cases, an extra dummy sample can be used to test pH preservation. Content should be suitably discarded.

If equipment blanks or field blanks are used, the maximum amount of preservative that was used to preserve any single sample in the set shall be added to the equipment or field blank.

Samples requiring temperature preservation shall be cooled to 4°C. The cooler will be checked to ensure that the ice has not melted.

14.3 SAMPLE CONTAINERS

ESC does not clean and re-use sample containers. ESC purchases all sample collection containers precleaned. All used sampling containers are discarded after use. The cleaning criteria of all containers must meet EPA analyte specific requirements.

QEC provides written certification that containers do not contain analytes of concern above method detection levels

ESC maintains records for these containers (lot numbers, certification statements, date of receipt, etc.) and intended uses are documented.

14.4 FIELD REAGENT HANDLING

Reagents, cleaning materials, and preservatives that are maintained by a field team will be stored, transported, and handled in such a way as to prevent and/or minimize contamination. The following storage and use protocols will be observed:

1. Chemicals will be stored in-house and transported to the field segregated by reactivity.
2. Acids are stored in an acid storage cabinet and solvents are stored in a vented, explosion proof solvent storage cabinet.
3. All chemicals transported to the field are stored in bottles and packed to avoid breaks.
4. When reagents are transferred from an original container, the transport container must be pre-cleaned and of compatible material as the original container.
5. Chemicals shall be separated from sample containers and samples to avoid reaction and possible contamination.
6. Analyte free water shall be segregated from solvents to prevent contamination.

14.4.1 Reagent and Standard Storage

Chemical	Method of Storage
Nitric acid	Stored separated from other acids in original container in vented cabinet.
Sulfuric acid	See above
Hydrochloric acid	See above
Isopropanol	Stored in original glass container in vented and explosion proof solvent storage cabinet.
pH calibration buffers, turbidity standards, conductivity standards	Stored in cabinet designated for standard and reagent storage. Stored in temperature-controlled area of laboratory.

Chemical	Method of Storage
Sodium hydroxide	Stored in original container in designated cabinet in laboratory.
Sodium thiosulfate, zinc acetate, ascorbic acid, lead acetate	Stored in original containers in designated area of laboratory. Reagent solutions made fresh prior to use.

14.5 SAMPLE TRANSPORT

In the majority of situations, samples will be delivered directly to the laboratory by the field sampling team or field courier following standard chain of custody protocols. Samples will be preserved immediately (i.e., within 15 minutes) and packed with ice prior to transport. The field team will relinquish custody to the login sample custodian upon arrival at the laboratory.

Certain situations require that the field sampling team ship samples to the laboratory utilizing common carrier (UPS, FEDEX, etc.). If samples are sent by common carrier, all documentation (transmittal form, chain of custody, field data, analyses request, etc.) shall be placed in a ziplock bag and placed inside the sample container. The container is then sealed closed and sent to the laboratory in the required time frame to meet requirements of time-sensitive analyses.

14.6 BIOMONITORING SAMPLING

Preservation and Sample Volume
Aqueous samples collected for Bioassay can be collected in either glass or HDPE plastic. There is no required chemical preservation for this type of sample but the sample must be kept at 4 ± 2°C. The required volume varies independently with each type of analysis but the minimum collected is 250mL. The samples can be held for a maximum of 36 hours from the time of collection until first use.

Sample Collection
Grab sample protocols are utilized for acute bioassay unless otherwise specified in permit requirements. Composite sampling protocols are utilized for chronic bioassays unless otherwise specified in permit requirements. (Actual sampling protocols are discussed in detail throughout this appendix) ESC field collection personnel are required to collect all bioassay samples by completely filling the sample bottle and leaving no headspace. It is important that bottles be filled completely to reduce possible aeration that may reduce the toxic properties of the sample. If a client chooses to collect the samples, a trained ESC field collection person will explain in detail the importance of reducing aeration by filling the sample bottle completely.

14.6.1 Biomonitoring Sampling Containers

All bioassay glassware are cleaned using the following EPA protocol:

- soak for 15 minutes in hot tap water with detergent and scrub

- rinse thoroughly with hot tap water
- rinse thoroughly with dilute nitric acid (10%)
- rinse thoroughly with deionized water
- rinse thoroughly with pesticide grade acetone

TABLE 14.6: PRESERVATION, HOLDING TIME AND SAMPLE CONTAINERS

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Air Methods									
Volatiles in Ambient Air	Air	EPA TO-15	NA	Various	Canister	None	Ambient	14	Days
Volatiles in Ambient Air	Air	EPA TO-15	NA	Various	Tedlar	None	Ambient	5	Days
Volatiles in Ambient Air	Air	EPA Method 18	NA	Various	Canister	None	Ambient	14	Days
Volatiles in Ambient Air	Air	EPA Method 18	NA	Various	Tedlar	None	Ambient	5	Days
Ohio VAP EPA Method 8260B	Air	NA	EPA 8260B	Various	Canister	None	Ambient	14	Days
Ohio VAP EPA Method 8260B	Air	NA	EPA 8260B	Various	Tedlar	None	Ambient	5	Days
Methane, Ethane, Ethene, Propane	Air	RSK-175	NA	Various	Canister	None	Ambient	14	Days
Methane, Ethane, Ethene, Propane	Air	RSK-175	NA	Various	Tedlar	None	Ambient	5	Days
Fixed Gases - C2, CO2, CO, and CH4	Air	ASTM D1946/D5314	NA	Various	Canister	None	Ambient	14	Days
Fixed Gases - C2, CO2, CO, and CH4	Air	ASTM D1946/D5314	NA	Various	Tedlar	None	Ambient	5	Days
Arizona State Specific VOCs in Vapor - 8260B	Air	NA	EPA 8260B	Various	Canister	None	Ambient	30	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Arizona State Specific VOCs in Vapor - 8260B	Air	NA	EPA 8260B	Various	Tedlar	None	Ambient	72	Hours
Arizona State Specific VOCs in Vapor - 8015B	Air	NA	EPA 8015B	Various	Canister	None	Ambient	30	Days
Arizona State Specific VOCs in Vapor - 8015B	Air	NA	EPA 8015B	Various	Tedlar	None	Ambient	72	Hours
Aquatic Toxicity & Related									
C.dubia - Acute	NPW	2002	NA	1L/1Gal	HDPE	None	0 - 6oC	36	Hours
Minnow - Acute	NPW	2000	NA	1L/1Gal	HDPE	None	0 - 6oC	36	Hours
Toxicity C.dubia - Chronic	NPW	1002	NA	1L/1Gal	HDPE	None	0 - 6oC	36	Hours
Toxicity Minnow - Chronic	NPW	1000	NA	1L/1Gal	HDPE	None	0 - 6oC	36	Hours
Bacteria									
Chlorophyll A/Pheophytin A	NPW	SM10200 H	NA	1L	Amber Glass	None	0 - 6oC	72	Hours
Coliform, Total	NPW	SM9222B	NA	110ml	Micro	Na2S2O3	0 - 6oC	8	Hours
E. Coli	NPW	SM9223B Colilert	NA	110ml	Micro	Na2S2O3	0 - 6oC	8	Hours
Enterococci	NPW	ASTM D6503-99, Enterolert	NA	110ml	Micro	Na2S2O3	0 - 6oC	8	Hours
Fecal Coliform	NPW	SM9222D	NA	110ml	Micro	Na2S2O3	0 - 6oC	6	Hours
Fecal Coliform	NPW	SM9221C /E	NA	110ml	Micro	Na2S2O3	0 - 6oC	6	Hours
Heterotropic Plate Count	NPW	9215B	NA	110ml	Micro	Na2S2O3	0 - 6oC	6	Hours

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Salmonella	NPW	SM9260D	NA	110ml	Micro	Na2S2O3	0 - 6oC	8	Hours
Cryptosporidium	PW	1622, 1623	NA	10L	LDPE	None	<20oC	96	Hours
E. Coli	PW	SM9223B	NA	110ml	Micro	Na2S2O3	0 - 6oC	30	Hours
Fecal Coliform (MPN)	PW	9221E	NA	110ml	Micro	Na2S2O3	0 - 6oC	30	Hours
Fecal Coliform	PW	SM9222D	NA	110ml	Micro	Na2S2O3	0 - 6oC	30	Hours
Enterococci	PW	ASTM D6503-99	NA	110ml	Micro	Na2S2O3	0 - 6oC	30	Hours
Heterotropic Plate Count	PW	9215B	NA	110ml	Micro	Na2S2O3	0 - 6oC	6	Hours
Coliform, Total	PW	9222B, 9223B	NA	110ml	Plastic	Na2S2O3	0 - 6oC	30	Hours
Coliform, Total	SS	SM9221B 9222	NA	Sterile 125mL	Plastic	None	0 - 6oC	24	Hours
Fecal Coliform (MPN)	SS	9221E	NA	Sterile 125mL	Plastic	None	0 - 6oC	24	Hours
Fecal Coliform (Sludge)	SS	9222D	NA	Sterile 125mL	Plastic	None	0 - 6oC	24	Hours
Enterococci	SS	ASTM D6503-99	9230	Sterile 125mL	Plastic	None	0 - 6oC	6	Hours
Salmonella	SS	SM9260D	NA	110ml	Micro	None	0 - 6oC	6	Hours
Heterotropic Plate Count	SS	SM9215B	NA	110ml	Micro	None	0 - 6oC	6	Hours
S.O.U.R.	SS	SM 2710B	NA	1L	HDPE	None	0 - 6oC	2	Hours
Inorganic Classic									
Acidity	NPW	SM2310B ASTM D1067	NA	250ml	HDPE	None	0 - 6oC	14	Days
Alkalinity	NPW	SM2320B	NA	500ml	HDPE	None	0 - 6oC	14	Days
Alkalinity	NPW	310.2	NA	500ml	HDPE	None	0 - 6oC	14	Days
Ammonia Nitrogen	NPW	350.1, SM4500NH3G	NA	500ml	HDPE	H2SO4+Na2S2O3	0 - 6oC	28	Days
Ammonia, distilled/titration (4500)	NPW	SM4500NH3C	NA	500ml	HDPE	H2SO4+Na2S2O4	0 - 6oC	28	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Asbestos	NPW	100.1	NA	1L	Glass	None	0 - 6oC	48	Hours
BOD/CBOD (Total & Soluble)	NPW	SM5210B	NA	1L	HDPE	None	0 - 6oC	48	Hours
Bromide	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6oC	28	Days
Carbon Dioxide	NPW	SM4500C O2 D	NA	1L	HDPE	None	0 - 6oC	15	Min
Chemical Oxygen Demand (COD)	NPW	410.4, SM5220D	NA	250ml	HDPE	H2SO4	0 - 6oC	28	Days
Chemical Oxygen Demand (COD), Soluble	NPW	410.4, SM5220D	NA	250ml	HDPE	None	0 - 6oC	28	Days
Chloride	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6oC	28	Days
Chlorine, residual	NPW	SM4500C l-G	NA	250ml	HDPE	None	0 - 6oC	15	Min
Color	NPW	SM2120B	NA	250ml	HDPE	None	0 - 6oC	48	Hours
CTAS Surfactants	NPW	SM5540D	NA	1L	HDPE	None	0 - 6oC	48	Hours
Cyanide - Total	NPW	335.4, SM4500C NE	9012	250ml	Amber HDPE	NaOH	0 - 6oC	14	Days
Cyanide - Total	NPW	Kelada-01	NA	250ml	Amber HDPE	NaOH	0 - 6oC	14	Days
Cyanide, Amenable	NPW	SM4500C NG	9012	250ml	Amber HDPE	NaOH	0 - 6oC	14	Days
Cyanide, Free	NPW	SM4500C NE	NA	250ml	Amber HDPE	NaOH	0 - 6oC	14	Days
Cyanide, Weak Acid Dissoc.	NPW	SM4500C N-I	NA	250ml	Amber HDPE	NaOH	0 - 6oC	14	Days
Dissolved Organic Carbon (DOC)	NPW	SM5310B	9060	250ml	Amber Glass	None	0 - 6oC	28	Days
Ferrous Iron	NPW	SM3500F	NA	250ml	Amber	HCl	0 - 6oC	15	Min

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
		eB			Glass				
Fluoride	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6oC	28	Days
Hardness	NPW	200.7, SM2340B	NA	250ml	HDPE	HNO3	0 - 6oC	180	Days
Hardness	NPW	130.1	NA	500ml	HDPE	HNO3	0 - 6oC	180	Days
Hardness	NPW	SM2340C	NA	500ml	HDPE	HNO3	0 - 6oC	180	Days
Iodide	NPW	345.1	NA	250ml	HDPE	None	0 - 6oC	Immed	
Kjeldahl Nitrogen, TKN	NPW	351.2, SM4500N orgB/C	NA	250ml	HDPE	H2SO4	0 - 6oC	28	Days
Methylene Blue Active Subst. (MBAS)	NPW	SM5540C	NA	250ml	HDPE	None	0 - 6oC	48	Hours
Nitrate	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6oC	48	Hours
Nitrate + Nitrite	NPW	353.2, SM4500N O3F	NA	250ml	HDPE	H2SO4	0 - 6oC	28	Days
Nitrite	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6oC	48	Hours
Oil & Grease (Hexane Extr)	NPW	1664A, SM5520B	9070	1L	Glass	HCl	0 - 6oC	28	Days
Oil & Grease, Free	NPW	1664A	9070	1L	Amber Glass	None	0 - 6oC	28	Days
Organic Nitrogen	NPW	351.2 - 350.1	NA	500ml	HDPE	H2SO4	0 - 6oC	28	Days
Oxygen, dissolved (DO)	NPW	SM4500O C, SM4500O G	NA	125ml	HDPE	None	0 - 6oC	15	Min
pH	NPW	SM4500H B	9040	125ml	HDPE	None	0 - 6oC	15	Min
Phenols (Total) by 4AAP	NPW	420.1, 420.4	9066	250ml	Amber Glass	H2SO4	0 - 6oC	28	Days
Phosphate, Ortho	NPW	365.1, SM4500P -E	NA	250ml	HDPE	None	0 - 6oC	48	Hours

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Phosphorus, Total	NPW	365.1, SM4500P -B.5	NA	250ml	HDPE	H2SO4	0 - 6oC	28	Days
Residue, Filterable (TDS)	NPW	SM2540C	NA	250ml	HDPE	None	0 - 6oC	7	days
Residue, non-Filterable (TSS)	NPW	SM2540D	NA	1L	HDPE	None	0 - 6oC	7	Days
Residue, Settleable (SS)	NPW	SM2540F	NA	1L	HDPE	None	0 - 6oC	48	Hours
Residue, Total (TS)	NPW	SM2540B	NA	250ml	HDPE	None	0 - 6oC	7	Days
Specific Conductance (Conductivity)	NPW	120.1, SM2510B	9050	250ml	HDPE	None	0 - 6oC	28	Days
Sulfate	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6oC	28	Days
Sulfide	NPW	NA	9030, 9034	500ml	HDPE	NaOH +ZnAc	0 - 6oC	7	Days
Sulfide	NPW	SM4500S 2D	NA	500ml	HDPE	NaOH +ZnAc	0 - 6oC	7	Days
Sulfide, Dissolved	NPW	SM4500S 2D	NA	125ml	Amber Glass	NaOH +ZnAc	0 - 6oC	7	Days
Sulfite	NPW	SM4500S O3B	NA	250ml	HDPE	None	0 - 6oC	15	Min
Tannins and Lignins	NPW	SM5550B	NA	250ml	HDPE	None	0 - 6oC	NA	
Temperature	NPW	SM2550B	NA	onsite		None	0 - 6oC	15	Min
Total Organic Carbon (TOC)	NPW	SM53010 B	9060	250ml	Amber Glass	HCl	0 - 6oC	28	Days
Total Organic Halides (TOX)	NPW	450.1, SM5320B	NA	1L	Amber Glass	H2SO4	0 - 6oC	28	Days
Turbidity	NPW	180.1, SM2130B	NA	250ml	HDPE	None	0 - 6oC	48	Hours
Volatile Solids (VS)	NPW	160.4	NA	250ml	HDPE	None	0 - 6oC	7	Days
Volatile Susp. Solids (VSS)	NPW	SM2540E	NA	500ml	HDPE	None	0 - 6oC	7	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Alkalinity	PW	2320B	NA	500ml	HDPE	None	0 - 6oC	14	Days
Ammonia Nitrogen	PW	350.1, SM4500NH3G	NA	250ml	HDPE	H2SO4	0 - 6oC	28	Days
Ammonia, distilled/titration (4500)	PW	SM4500NH3C	NA	250ml	HDPE	H2SO4	0 - 6oC	28	Days
Asbestos	PW	100.1	NA	1L	Glass	None	0 - 6oC	48	Hours
Bromide	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6oC	28	Days
Calcium-hardness	PW	SM3500-Ca B	NA	250ml	Amber Glass	HNO3	0 - 6oC	180	Days
Carbon Dioxide	PW	SM4500CO2 D	NA	1L	HDPE	None	0 - 6oC	15	Min
Chloride	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6oC	28	Days
Chlorine, residual	PW	SM4500Cl-G	NA	250ml	HDPE	None	0 - 6oC	15	Min
Color	PW	SM2120B	NA	250ml	HDPE	None	0 - 6oC	48	Hours
Corrosivity	PW	Calc	NA		Plastic	None	0 - 6oC	NA	
Cyanide - Total	PW	335.4, SM4500CNE	NA	250ml	HDPE Amber	NaOH	0 - 6oC	14	Days
Cyanide - Total	PW	Kelada-01	NA	250ml	HDPE Amber	NaOH	0 - 6oC	14	Days
Cyanide, Amenable	PW	SM4500CNG	NA	250ml	HDPE Amber	NaOH	0 - 6oC	14	Days
Cyanide, Free	PW	SM4500CNE	NA	250ml	HDPE Amber	NaOH	0 - 6oC	14	Days
Dissolved Organic Carbon (DOC)	PW	SM5310C	NA	250ml	Amber Glass	None	0 - 6oC	28	Days
Dissolved Solids (TDS)	PW	SM2540C	NA	250ml	HDPE	None	0 - 6oC	7	Days
Fluoride	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6oC	28	Days
Hardness	PW	200.7, SM2340B	NA	250ml	HDPE	HNO3	0 - 6oC	180	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Hardness	PW	130.1	NA	500ml	HDPE	HNO3	0 - 6oC	180	Days
Hardness	PW	SM2340C	NA	500ml	HDPE	HNO3	0 - 6oC	180	Days
Methylene Blue Active Subst. (MBAS)	PW	SM5540C	NA	1L	HDPE	None	0 - 6oC	48	Hours
Nitrate	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6oC	48	Hours
Nitrate + Nitrite	PW	353.2, SM4500NO3F	NA	250ml	HDPE	H2SO4	0 - 6oC	28	Days
Nitrite	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6oC	48	Hours
Odor	PW	SM2150B	NA	250ml	Amber Glass	None	0 - 6oC	24	Hours
Perchlorate	PW	314	NA	125ml	HDPE	None	0 - 6oC	28	Days
pH	PW	150.1, SM4500-H B	NA	125ml	HDPE	None	0 - 6oC	15	Min
Phosphate, Ortho	PW	SM4500P-E	NA	250ml	HDPE	None	0 - 6oC	48	Hours
Specific Conductance	PW	SM2510B	NA	250ml	HDPE	None	0 - 6oC	28	Days
Sulfate	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6oC	28	Days
Total Organic Carbon (TOC)	PW	SM5310C	NA	250ml	Amber Glass	H2SO4	0 - 6oC	28	Days
Total Organic Halides (TOX)	PW	SM5320B	NA	1L	Amber Glass	H2SO4	0 - 6oC	28	Days
Turbidity	PW	180.1, SM2130B	NA	250ml	HDPE	None	0 - 6oC	48	Hours
UV Absorbance at 254 nm	PW	SM5910B	NA	250ml	Amber Glass	None	0 - 6oC	48	Hours
Asbestos	SS	PLM	NA			None	0 - 6oC	NA	
Bromide	SS	NA	9056	4 oz.	Glass	None	0 - 6oC	28	Days
Chloride	SS	NA	9056	4 oz.	Glass	None	0 - 6oC	28	Days
Corrosivity	SS	NA	9045D	4 oz.	Glass	None	0 - 6oC	15	Min
Cyanide -	SS	NA	9010/90	4 oz.	Glass	None	0 - 6oC	14	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Total			12						
Cyanide, Amenable	SS	NA	9010/9012	4 oz.	Glass	None	0 - 6oC	14	Days
Cyanide, Free	SS	NA	9010/9012	4 oz.	Glass	None	0 - 6oC	14	Days
Extractable Organic Halides (EOX)	SS	NA	9023	4 oz.	Glass	None	0 - 6oC	28	Days
Fluoride	SS	NA	9056	4 oz.	Glass	None	0 - 6oC	28	Days
Kjeldahl Nitrogen, TKN	SS	351.2	NA	2 oz.	Glass	None	0 - 6oC	28	Days
Nitrate	SS	NA	9056	4 oz.	Glass	None	0 - 6oC	28	Days
Nitrite	SS	NA	9056	4 oz.	Glass	None	0 - 6oC	28	Days
Oil & Grease	SS	NA	9071	4 oz.	Glass	None	0 - 6oC	28	Days
pH	SS	NA	9040, 9045	2 oz.	Glass	None	0 - 6oC	15	Min
Phenols by 4AAP	SS	NA	9066	4 oz.	Glass	None	0 - 6oC	28	Days
Phosphate, Ortho	SS	SM4500P-E	NA	4 oz.	Glass	None	0 - 6oC	48	Hours
Phosphorus, Total	SS	NA	9056	4 oz.	Glass	None	0 - 6oC	28	Days
Residue, Total	SS	SM2540G	NA	4 oz.	Glass	None	0 - 6oC	14	Days
Solids, Total	SS	SM2540B	NA	4 oz.	Glass	None	0 - 6oC	14	Days
Specific Conductance	SS	NA	9050	4 oz.	Glass	None	0 - 6oC	28	Days
Sulfate	SS	NA	9056	4 oz.	Glass	None	0 - 6oC	28	Days
Sulfide	SS	NA	9030, 9034	2 oz.	Glass	none	0 - 6oC	7	Days
Total Organic Carbon (TOC)	SS	NA	9060	2 oz.	Glass	None	0 - 6oC	28	Days
Total Organic Carbon (TOC)	SS	ASTM F1647-02A mod	NA	4 oz.	Glass	None	0 - 6oC	28	Days
Total Organic Carbon (TOC)	SS	USDA LOI	NA	4 oz.	Glass	None	0 - 6oC	28	Days
Inorganic Metals									

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Chromium, Hexavalent - Cr+6	NPW	SM3500C rB	7196	250ml	HDPE	None	0 - 6oC	24	Hours
Chromium, Hexavalent - Cr+6	NPW	SM3500C rC	7199	250ml	HDPE	None	0 - 6oC	24	Hours
Chromium, Hexavalent - Cr+6	NPW	218.6, SM3500C rC	NA	125ml	HDPE	(NH4)2SO4	0 - 6oC	28 5	Days
Mercury (Dissolved)	NPW	245.1	7470	500ml	HDPE	None	0 - 6oC	28	Days
Mercury (Total)	NPW	245.1	7470	500ml	HDPE	HNO3	0 - 6oC	28	Days
Metals (Dissolved) ICP	NPW	200.7	6010	500ml	HDPE	None	NA	180	Days
Metals (Dissolved) ICPMS	NPW	200.8	6020	500nl	HDPE	None	NA	180	Days
Metals (Total) ICP	NPW	200.7	6010	500ml	HDPE	HNO3	NA	180	Days
Metals (Total) ICPMS	NPW	200.8	6020	500ml	HDPE	HNO3	NA	180	Days
Chromium, Hexavalent - Cr+6	PW	218.7	NA	125ml	HDPE	(NH4)2SO4 /(NH4)OH	0 - 6oC	14	Days
Mercury (Dissolved)	PW	245.1	NA	500ml	HDPE	None	0 - 6oC	28	Days
Mercury (Total)	PW	245.1	NA	500ml	HDPE	HNO3	0 - 6oC	28	Days
Metals (Dissolved) ICP	PW	200.7	NA	500ml	HDPE	None	NA	180	Days
Metals (Dissolved) ICPMS	PW	200.8	NA	500ml	HDPE	None	NA	180	Days
Metals (Total) ICP	PW	200.7	NA	500ml	HDPE	HNO3	NA	180	Days
Metals (Total) ICPMS	PW	200.8	NA	500ml	HDPE	HNO3	NA	180	Days
Chromium, Hexavalent -	SS	NA	3060/7196	4 oz.	Glass	None	0 - 6oC	30	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Cr+6									
Chromium, Hexavalent - Cr+6	SS	NA	3060/7199	4 oz.	Glass	None	0 - 6oC	30	Days
Mercury (Total)	SS	NA	7471	2 oz.	Glass	<6 C	0 - 6oC	28	Days
Metals (Total) ICP	SS	NA	6010	2 oz.	Glass	None	NA	180	Days
Metals (Total) ICPMS	SS	NA	6020	4 oz.	Glass	None	NA	180	Days
Sodium Adsorption Ratio (SAR)	SS	NA	6010	250mL	Glass	None	0 - 6oC	180	Days
Michigan Fine/Coarse Soil Sieve for Lead	SS	NA	NA	250mL	Glass	None	0 - 6oC	180	Days
Physical									
Flashpoint/ ignitability (Closed Cup)	NPW	ASTM 93-07	1010	1L	Glass	None	0 - 6oC	14	Days
Flashpoint/ ignitability (Open Cup)	NPW	ASTM 92-05A	NA	1L	Glass	None	0 - 6oC	14	Days
Flashpoint/ ignitability (Closed Cup)	SS	ASTM 93-07	1010	4 oz.	Glass	None	0 - 6oC	14	Days
Flashpoint/ ignitability (Open Cup)	SS	ASTM 92-05A	NA	4 oz.	Glass	None	0 - 6oC	NA	
Ash Content	SS	SM2540G, ASTM D2974	NA	4 oz.	Glass	None	0 - 6oC	14	Days
Cation Exchange Capacity	SS	NA	9081	4 oz.	Glass	None	0 - 6oC	180	Days
Paint Filter Test	SS	NA	9095	4 oz.	Glass	None	0 - 6oC	NA	
Permeability (Section 2.8)	SS	NA	9100	Various	Shelby Tube	None	0 - 6oC	28	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
React. Sulf.(SW846 7.3.4.2)	SS	NA	Sec. 7.3	4 oz.	Glass	None	0 - 6oC	7	Days
Reactive CN (SW846 7.3.4.1)	SS	NA	Sec. 7.3	4 oz.	Glass	None	0 - 6oC	14	Days
Resistivity (ASTM)	SS	NA	NA	16 oz	Glass	None	0 - 6oC	28	Days
Specific Gravity	SS	NA	NA	Various	Plastic	None	0 - 6oC	14	Days
Leaching Methods									
Cal Wet (CACR Title22 Chap11 AppII)	SS	NA	NA	100g	Glass	None	0 - 6oC	14/28/180	Days
EP TOX	SS	NA	1310	100g	Glass	None	0 - 6oC	14/28/180	Days
MEP	SS	NA	1320	100g	Glass	None	0 - 6oC	14/28/180	Days
SPLP	SS	NA	1312	100g	Glass	None	0 - 6oC	14/28/180	Days
TCLP	SS	NA	1311	100g	Glass	None	0 - 6oC	14/28/180	Days
Organics - Semivolatiles									
Base/Neutral/ Acid (BNA)	NPW	NA	8270	1L or 100mL	Amber Glass	None	0 - 6oC	7	Days
Base/Neutral/ Acid (BNA)	NPW	625, SM6410B	NA	1L or 100mL	Amber Glass	Na2S2O3	0 - 6oC	7	Days
Diesel Range Organics	NPW	NA	8015	1L, 100mL, or 40mL	Amber Glass	HCl	0 - 6oC	7	Days
Dioxin	NPW	1613	NA	1L	Amber Glass	Na2S2O3	0 - 6oC	1	Year
EDB/DBCP	NPW	NA	8011	2 x 40 ml	Glass	Na2S2O3	0 - 6oC	7	Days
Formaldehyde	NPW	NA	8315	1L	Amber Glass	None	0 - 6oC	3	Days
Herbicides	NPW	1658, SM6640B	8151	1L	Amber Glass	None	0 - 6oC	7	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Polynuclear Aromatic Hydrocarbons (PAH)	NPW	625, SM640B	8270	1L, 100mL, or 40mL	Amber Glass	None	0 - 6oC	7	Days
Polynuclear Aromatic Hydrocarbons (PAH-SIM)	NPW	NA	8270	1L, 100mL, or 40mL	Amber Glass	None	0 - 6oC	7	Days
Polynuclear Aromatic Hydrocarbons (PAH)	NPW	610, SM6440B	8310	1L	Amber Glass	None	0 - 6oC	7	Days
Pesticides - Organophos Comp	NPW	614, 622, 1657	8141	1L	Amber Glass	None	0 - 6oC	7	Days
Pesticides & PCB's	NPW	608, SM6630B , SM6630C	8081, 8082	1L or 100mL	Amber Glass	None	0 - 6oC	7	Days
Base/Neutral/ Acid (BNA)	PW	525	NA	1L	Amber Glass	HCl + Na2S2O3	0 - 6oC	7	Days
Carbamates	PW	531.1	NA	2 x 60ml	Amber Glass	AcAcid + Na2S2O3	0 - 6oC	7	Days
Dioxin	PW	1613	NA	1L	Amber Glass	Na2S2O3	0 - 6oC	7	Days
Diquat	PW	549	NA	1L	PVC Amber	H2SO4 + Na2S2O3	0 - 6oC	7	Days
EDB/DBCP	PW	504.1	NA	2 x 40 ml	Glass	Na2S2O3	0 - 6oC	28	Days
Endothall	PW	548	NA	250ml	Amber Glass	Na2S2O3	0 - 6oC	7	Days
Glyphosate	PW	547	NA	2 x 60ml	Glass	Na2S2O3	0 - 6oC	7	Days
Herbicides	PW	515.1, SM6640B	NA	1L	Amber Glass	Na2S2O3	0 - 6oC	7	Days
Pesticides - Nitrogen/phos phorus Comp	PW	507	NA	1L	Amber Glass	Na2S2O3	0 - 6oC	14	Days
Pesticides - Organochlorine	PW	508	NA	1L	Amber Glass	Na2S2O3	0 - 6oC	7	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Haloacetic acids - HAAs	PW	552.2	NA	500ml	Amber Glass	NH4Cl	0 - 6oC	28	Days
Base/Neutral/ Acid (BNA)	SS	NA	8270	4 oz.	Glass	None	0 - 6oC	14	Days
Dioxin	SS	NA	8290	5 oz.	Glass	None	0 - 6oC	30	Days
Formaldehyde	SS	NA	8315	4 oz.	Glass	None	0 - 6oC	3	Days
Herbicides	SS	NA	8151	4 oz.	Glass	None	0 - 6oC	14	Days
Polynuclear Aromatic Hydrocarbons (PAH)	SS	NA	8270	4 oz.	Glass	None	0 - 6oC	14	Days
Polynuclear Aromatic Hydrocarbons (PAH-SIM)	SS	NA	8270	4 oz.	Glass	None	0 - 6oC	14	Days
Polynuclear Aromatic Hydrocarbons (PAH)	SS	NA	8310	4 oz.	Glass	None	0 - 6oC	14	Days
Pesticides - Organophos Comp	SS	NA	8141	4 oz.	Glass	None	0 - 6oC	14	Days
Pesticides & PCBs	SS	NA	8081, 8082	4 oz.	Glass	None	0 - 6oC	14	Days
Total Chlorine in Oil	SS	ASTM D808-00	NA	125ml	HDPE	None	0 - 6oC	24	Hours
Organic - Volatiles									
Meetac - Methanol and Ethanol	NPW	NA	EPA 8015 Mod	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Methane, Ethane, Ethene, Propane	NPW	RSK-175	NA	40ml	Amber Glass	HCl	0 - 6oC	14	Days
BTEX (water)	NPW	602, SM6200C	8021	2 x 40 ml	Amber Glass	HCl	0 - 6oC	14	Days
BTEX (water)	NPW	602, SM6200C	8021	2 x 40 ml	Amber Glass	None	0 - 6oC	7	Days
Gasoline Range Organics	NPW	NA	8015	2 x 40 ml	Amber Glass	HCl	0 - 6oC	14	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
(GRO)									
VOCs	NPW	624, SM6200B	8260	2 x 40 ml	Amber Glass	HCl	0 - 6oC	14	Days
VOCs	NPW	624, SM6200B	8260	2 x 40 ml	Amber Glass	none	0 - 6oC	7	Days
VOCs	PW	524.2	NA	2 x 40 ml	Amber Glass	Ascorbic Acid+HCl	0 - 6oC	14	Days
Meetac - Methanol and Ethanol	SS	NA	EPA 8015 Mod	2 oz.	Glass	None	0 - 6oC	14	Days
BTEX (soil)	SS	NA	8021	4 oz.	Glass	None	0 - 6oC	14	Days
VOCs	SS	NA	8260	2 oz.	Glass	none	0 - 6oC	14	Days
VOCs	SS	NA	8260	40ml	Amber Glass	MeOH	0 - 6oC	14	Days
VOCs	SS	NA	8260	40ml	Amber Glass	NaHSO4 or TSP(MO) or DI Water(FL)	0 - 6oC	14	Days
VOCs	SS	NA	8260	NA	Encore	none	0 - 6oC	48	Hours
Radiochemistry									
Gross alpha	NPW	900	na	1L	Plastic	HNO3	0 - 6oC	180	Days
Gross beta	NPW	900	na	1L	Plastic	HNO3	0 - 6oC	180	Days
Radium 226	NPW	903.1	na	1L	Plastic	HNO3	0 - 6oC	180	Days
Radium 228	NPW	904	na	1L	Plastic	HNO3	0 - 6oC	180	Days
Gross alpha	PW	900	na	1L	HDPE	HNO3	0 - 6oC	180	Days
Gross beta	PW	900	na	1L	HDPE	HNO3	0 - 6oC	180	Days
Radium 226	PW	903.1	na	1L	HDPE	HNO3	0 - 6oC	180	Days
Radium 228	PW	904	na	1L	HDPE	HNO3	0 - 6oC	180	Days
Tritium	PW	906	na	1L	HDPE	None	0 - 6oC	180	Days
Strontium-90	PW	905	na	1L	HDPE	HNO3	0 - 6oC	180	Days
State Specific Petroleum Methods									
Alaska DRO	NPW	NA	AK102	100ml	Amber Glass	HCl	0 - 6oC	14	Days
Alaska DRO	SS	NA	AK102	4 oz.	Glass	None	0 - 6oC	14	Days
Alaska GRO	NPW	NA	AK101	40ml	Amber Glass	HCl	0 - 6oC	14	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Alaska GRO	SS	NA	AK101	60ml	Amber Glass	MeOH	0 - 6oC	28	Days
Alaska Motor Oil	NPW	NA	AK103	100ml	Glass	HCl	0 - 6oC	14	Days
Alaska Motor Oil	SS	NA	AK103	4 oz.	Glass	None	0 - 6oC	14	Days
Arizona GRO	SS	NA	AZ 8015	2 oz.	Glass	None	0 - 6oC	14 9	Days
Arizona TPH	SS	NA	AZ 8015	4 oz.	Glass	None	0 - 6oC	14	Days
California DRO	NPW	NA	8015	1L	Amber Glass	HCl	0 - 6oC	7	Days
California DRO	NPW	NA	8015	40ml	Amber Glass	HCl	0 - 6oC	7	Days
California DRO	SS	NA	8015	4 oz.	Glass	None	0 - 6oC	7	Days
Connecticut EPH	NPW	NA	8015	1L	Amber Glass	HCl	0 - 6oC	14	Days
Connecticut EPH	SS	NA	8015	4 oz.	Glass	None	0 - 6oC	14	Days
Florida TPH	NPW	NA	FL-Pro	1L	Amber Glass	HCl	0 - 6oC	7	Days
Florida TPH	SS	NA	FL-Pro	4 oz.	Glass	None	0 - 6oC	14	Days
Indiana DRO	NPW	NA	8015	1L	Amber Glass	HCl	0 - 6oC	7	Days
Indiana DRO	SS	NA	8015	4 oz.	Glass	None	0 - 6oC	14	Days
Indiana ERO	NPW	NA	8015	1L	Amber Glass	HCl	0 - 6oC	7	Days
Indiana ERO	SS	NA	8015	4 oz.	Glass	None	0 - 6oC	7	Days
Indiana GRO	NPW	NA	8015	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Indiana GRO	SS	NA	8015	40ml	Amber Glass	MeOH	0 - 6oC	14	Days
Indiana GRO	SS	NA	8015	40ml	Amber Glass	NaHSO4	0 - 6oC	14	Days
Iowa GRO	NPW	NA	OA-1	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Iowa GRO	SS	NA	OA-1	4 oz.	Glass	None	0 - 6oC	14	Days
Iowa DRO	NPW	NA	OA-2	1L	Amber Glass	None	0 - 6oC	7	Days
Iowa DRO	SS	NA	OA-2	4 oz.	Glass	None	0 - 6oC	14	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Louisiana EPH	NPW	NA	MADEP EPH	1L	Amber Glass	HCl	0 - 6oC	14	Days
Louisiana EPH	SS	NA	MADEP EPH	4 oz.	Amber Glass	None	0 - 6oC	14	Days
Louisiana VPH	NPW	NA	MADEP VPH	1L	Amber Glass	HCl	0 - 6oC	14	Days
Louisiana VPH	SS	NA	MADEP VPH	40ml	Amber Glass	MeOH	0 - 6oC	28	Days
Massachusetts EPH	NPW	NA	MADEP EPH	1L	Amber Glass	HCl	0 - 6oC	14	Days
Massachusetts EPH	SS	NA	MADEP EPH	4 oz.	Amber Glass	None	0 - 6oC	14	Days
Massachusetts VPH	NPW	NA	MADEP VPH	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Massachusetts VPH	SS	NA	MADEP VPH	40ml	Amber Glass	MeOH	0 - 6oC	28	Days
Minnesota DRO	NPW	NA	WI DRO	1L	Amber Glass	HCl	0 - 6oC	7	Days
Minnesota DRO	SS	NA	WI DRO	60ml	Amber Glass	CH3Cl	0 - 6oC	47 9	Days
Minnesota GRO	NPW	NA	WI GRO	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Minnesota GRO	SS	NA	WI GRO	60ml	Amber Glass	MeOH	0 - 6oC	21 7	Days
Missouri DRO	NPW	NA	8270	1L	Amber Glass	None	0 - 6oC	7	Days
Missouri DRO	SS	NA	8270	4 oz.	Glass	None	0 - 6oC	14	Days
Missouri GRO	NPW	NA	8260	40ml	Amber Glass	TSP	0 - 6oC	14	Days
Missouri GRO	SS	NA	8260	40ml	Amber Glass	TSP	0 - 6oC	14	Days
Missouri GRO	SS	NA	8260	40ml	Amber Glass	MeOH	0 - 6oC	14	Days
Montana EPH	NPW	NA	MT EPH	1L	Amber Glass	HCl	0 - 6oC	14	Days
Montana EPH	SS	NA	MT EPH	4 oz.	Amber Glass	None	0 - 6oC	14	Days
Montana VPH	NPW	NA	MT VPH	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Montana VPH	SS	NA	MT	Encore	Amber	None	0 - 6oC	7	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
			VPH		Glass				
Montana VPH	SS	NA	MT VPH	40ml	Amber Glass	MeOH	0 - 6oC	28	Days
New Jersey EPH	NPW	NA	NJ EPH	1L	Amber Glass	HCl	0 - 6oC	14	Days
New Jersey EPH	SS	NA	NJ EPH	4 oz.	Amber Glass	None	0 - 6oC	14	Days
North Carolina EPH	NPW	NA	MADEP EPH	1L	Amber Glass	HCl	0 - 6oC	14	Days
North Carolina EPH	SS	NA	MADEP EPH	4 oz.	Amber Glass	None	0 - 6oC	14	Days
North Carolina VPH	NPW	NA	MADEP VPH	1L	Amber Glass	HCl	0 - 6oC	14	Days
North Carolina VPH	SS	NA	MADEP VPH	40ml	Amber Glass	MeOH	0 - 6oC	28	Days
Ohio DRO	NPW	NA	8015	1L	Amber Glass	None	0 - 6oC	7	Days
Ohio DRO	NPW	NA	8015	100ml	Amber Glass	None	0 - 6oC	7	Days
Ohio DRO	NPW	NA	8015	40ml	Amber Glass	None	0 - 6oC	7	Days
Ohio DRO	SS	NA	8015	4 oz.	Glass	None	0 - 6oC	14	Days
Ohio GRO	NPW	NA	8015	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Ohio GRO	SS	NA	8015	2 oz.	Glass	None	0 - 6oC	14	Days
Ohio GRO (VAP)	SS	NA	8015	Encore - Low Level	None	None	0 - 6oC	14 8	Days
Ohio GRO (VAP)	SS	NA	8015	Encore - High Level	None	MeOH	0 - 6oC	14	Days
Oklahoma DEQ GRO	NPW	NA	OK DEQ GRO	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Oklahoma DEQ GRO	SS	NA	OK DEQ GRO	4 oz.	Glass	None	0 - 6oC	14	Days
Oklahoma DEQ DRO	NPW	NA	OK DEQ DRO	1L	Amber Glass	HCl	0 - 6oC	7	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Oklahoma DEQ DRO	SS	NA	OK DEQ DRO	60ml	Amber Glass	CH3Cl	0 - 6oC	7 6	Days
Oregon TPH-Gx	NPW	NA	NWTP H-Gx	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Oregon TPH-Gx	SS	NA	NWTP H-Gx	4 oz.	Glass	None	0 - 6oC	14	Days
Oregon TPH-Dx	NPW	NA	NWTP H-Dx	1L	Amber Glass	HCl	0 - 6oC	14	Days
Oregon TPH-Dx	SS	NA	NWTP H-Dx	4 oz.	Glass	None	0 - 6oC	14	Days
Tenneessee DRO	NPW	NA	TN EPH	1L	Amber Glass	HCl	0 - 6oC	7	Days
Tenneessee DRO	NPW	NA	TN EPH	100 ml	Amber Glass	HCl	0 - 6oC	7	Days
Tenneessee DRO	SS	NA	TN EPH	4 oz.	Glass	None	0 - 6oC	14	Days
Tenneessee GRO	NPW	NA	TN GRO	40ml	Amber Glass	HCl	0 - 6oC	7	Days
Tenneessee GRO	SS	NA	TN GRO	2 oz.	Glass	None	0 - 6oC	14	Days
Texas TPH	NPW	NA	TX1005 /TX1006	60ml	Amber Glass	HCl	0 - 6oC	14	Days
Texas TPH	SS	NA	TX1005 /TX1006	4 oz.	Glass	None	0 - 6oC	14	Days
Washington TPH-Gx	NPW	NA	NWTP H-Gx	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Washington TPH-Gx	SS	NA	NWTP H-Gx	4 oz.	Glass	None	0 - 6oC	14	Days
Washington TPH-Dx	NPW	NA	NWTP H-Dx	1L	Amber Glass	HCl	0 - 6oC	14	Days
Washington TPH-Dx	SS	NA	NWTP H-Dx	4 oz.	Glass	None	0 - 6oC	14	Days
Wisconsin DRO	NPW	NA	WI DRO	1L	Amber Glass	HCl	0 - 6oC	7	Days
Wisconsin DRO	NPW	NA	WI DRO	100 ml	Amber Glass	HCl	0 - 6oC	7	Days
Wisconsin DRO	SS	NA	WI DRO	60ml	Amber Glass	CH3Cl	0 - 6oC	47 9	Days
Wisconsin GRO	NPW	NA	WI GRO	40ml	Amber Glass	HCl	0 - 6oC	14	Days

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Wisconsin GRO	SS	NA	WI GRO	60ml	Amber Glass	MeOH	0 - 6oC	21 7	Days
Wyoming DRO	NPW	NA	8015	40ml	Amber Glass	HCl	0 - 6oC	7	Days
Wyoming DRO	NPW	NA	8015	1L	Amber Glass	HCl	0 - 6oC	7	Days
Wyoming DRO	SS	NA	8015	4 oz.	Glass	None	0 - 6oC	14	Days
Wyoming GRO	NPW	NA	8015	40ml	Amber Glass	HCl	0 - 6oC	14	Days
Wyoming GRO	SS	NA	8015	2 oz.	Glass	None	0 - 6oC	14	Days
Industry Hygiene (IH) Methods									
Particulates not otherwise regulated	Air	NIOSH 0500	NA	NA	2 piece 37mm PVC Pre-weighed filter	None	NA	NA	NA
Respirable Dust	Air	NIOSH 0600	NA	NA	3 piece 37mm PVC Pre-weighed filter	None	NA	NA	NA
Formaldehyde	Air	NIOSH 3500	NA	NA	PTFE Filter with 2 Impinger aliquots	None	0 - 6oC	28	Days
1,3-Butadiene	Air	NIOSH 1024	NA	NA	Sorbent Tube	Frozen	Frozen	NA	NA
Aromatic Hydrocarbons	Air	NIOSH 1501	NA	NA	Sorbent Tube	None	NA	NA	NA
Total Hydrocarbons	Air	NIOSH 1550	NA	NA	Sorbent Tube	None	NA	NA	NA
1,3-Butadiene	Air	OSHA 56	NA	NA	Sorbent Tube	None	NA	NA	NA
1,3-Butadiene	Air	NIOSH 1024	NA	NA	Diffusive Samplers	Frozen	Frozen	NA	NA

Parameter	Matrix 1	EPA Approved Method2	SW846 Method 3	Rec Vol	Bottle Type	Preserv 4	Temp	Holding Time	Holding Time Units
Aromatic Hydrocarbons	Air	NIOSH 1501	NA	NA	Diffusive Samplers	None	NA	NA	NA
Total Hydrocarbons	Air	NIOSH 1550	NA	NA	Diffusive Samplers	None	NA	NA	NA
1,3-Butadiene	Air	OSHA 56	NA	NA	Diffusive Samplers	None	NA	NA	NA
Metals	Air	NA	EPA 6010B	NA	0.8-µm MCE or 5.0-µm PVC cassette	None	NA	NA	NA
Metals	Air	NIOSH 7300	NA	NA	0.8-µm MCE or 5.0-µm PVC cassette	None	NA	NA	NA
Metals	Air	OSHA ID-125G	NA	NA	0.8-µm MCE or 5.0-µm PVC cassette	None	NA	NA	NA
Hexavalent Chromium	Air	NIOSH 7604	NA	NA	5.0-µm PVC cassette	None	NA	NA	NA
Hexavalent Chromium	Air	OSHA ID-215	NA	NA	5.0-µm PVC cassette	None	NA	NA	NA

Footnotes:

1) Matrix - NPW=Nonpotable Water, PW= Potable Water, SS=Solids

2) EPA Approved Method - Where applicable EPA methods are listed. Compounds/programs not regulated by EPA will have methods appropriate to their regulatory oversight.

3) SW846 Method - Where one exists, the appropriate Solid Waste method will be listed

4) Preservative Key

(NH4)2SO4 = Ammonium Sulfate
AcAcid = Acetic Acid
CH3Cl = Methylene Chloride
H2SO4 = Sulfuric Acid
HCl= Hydrochloric Acid
HNO3 = Nitric Acid
MeOH = Methanol

Na2S2O3 = Sodium Thiosulfate
NaHSO4 = Sodium Bisulfate
NH4Cl = Ammonium Chloride
TSP = Trisodium Phosphate
ZnAc = Zinc Acetate

5) Must be field filtered to achieve the extended holding time.
6) Must be received by lab within 7 days of sampling for solvent addition.
7) Must be received by lab within 4 days of sampling for solvent addition.
8) Must be received by lab within 48 hours of sampling for freezing.
9) Must be received by lab within 72 hours of sampling for solvent addition.

14.7 SAMPLE CONTAINER PACKING PROCEDURES

ESC routinely sends sample containers to clients. Standard operating procedure determines the containers needed for the requested analyses. A sample request form is completed to document what is needed, the destination, the date prepared and the initials of the preparer. Containers are prepared, with appropriate preservatives, labels, and custody seals, and organized for the client's convenience in a cooler. The cooler also contains a temperature blank, chain of custody, a return address label, and applicable instructions. The cooler is bound with packaging tape (and a custody seal if requested) and shipped UPS.

15.0 SAMPLE DISPATCH

Samples collected during field investigations or in response to a hazardous materials incident are classified by the project manager, prior to shipping, as either environmental or hazardous material samples. The shipment of samples, designated as environmental samples, is not regulated by the U.S. Department of Transportation.

Samples collected from certain process streams, drums, bulk storage tanks, soil, sediment, or water samples from suspected areas of high contamination may need to be shipped as hazardous. These regulations are promulgated by the US-DOT and described in the Code of Federal Regulations (49 CFR 171 through 177). The guidance for complying with US-DOT regulations in shipping environmental laboratory samples is given in the "National Guidance Package for Compliance with Department of Transportation Regulations in the Shipment of Environmental Laboratory Samples."

15.1 SHIPMENT OF ENVIRONMENTAL SAMPLES

Shipping receipts are maintained at the ESC laboratory. The shipment of preserved sample containers or bottles of preservatives (i.e., NaOH pellets, HCl, etc.) which are

designated as hazardous under the US-DOT, Hazardous Materials Table, 49 CFR 171.101, must be transported pursuant to the appropriate US-DOT regulations.

Samples packaged for shipment by ESC shall be segregated by sample type, preservation requirements, and potential contaminant level. During events in which large numbers of samples will be collected, samples are segregated by analyses required. If multiple sites are sampled, or if specific and separate areas of interest are identified, samples will be further segregated for packaging prior to shipment.

Environmental samples shall be packed prior to shipment using the following procedures:

1. Select a cooler (clean and strong). Line the cooler with a large heavy-duty plastic bag.
2 Allow sufficient headspace (except VOC's or others with zero headspace requirements) to compensate for any pressure and temperature changes.
3. Be sure the lids on all bottles are tight.
4. Place all bottles in appropriately sized polyethylene bags.
5. Place VOC vials in foam material transport sleeves.
6. Place foam padding in the bottom of the cooler and then place the bottles in the cooler with sufficient space to allow for the addition of more foam between the bottles.
7. Put ice on top of and/or between the samples.
8. Place chain of custody in a clean dry bag and into the cooler. Close the cooler and securely tape the cooler shut. The chain of custody seals should be affixed to the top and sides of the cooler so that the cooler cannot be opened without breaking the seal.
9. The shipping containers must be marked "THIS END UP". The name and address of the shipper shall be placed on the outside of the container. Labels used in the shipment of hazardous materials are not permitted to be on the outside of the container used to transport environmental samples and shall not be used.

16.0 INVESTIGATION WASTE

16.1 GENERAL

Field surveys conducted by ESC may generate waste materials. Some of these waste materials may be hazardous requiring proper disposal in accordance with EPA regulations.

16.1.1 Types of Investigation Derived Wastes (IDW)

Materials which may be included in the IDW category are:

- Personnel protective equipment (PPE)
- Disposable sampling equipment (DE)
- Soil cuttings
- Groundwater obtained through well purging
- Spent cleaning and decontamination fluids
- Spent calibration standards

16.1.2 Managing Non-hazardous IDW

Disposal of non-hazardous IDW should be addressed prior to initiating work at a site. Facility personnel should be consulted and wastes handled in an appropriate manner as directed by the client.

For development and purge water generated in the State of Florida, specific disposal requirements apply. The water shall be contained on-site in temporary storage until it is characterized. Appropriate disposal and/or treatment methods will then be determined. Possible disposal options are:

- Direct discharge on-site to infiltrate the same or a more contaminated source
- Transportation to an off-site facility

In no case shall the water be discharged into any surface water unless permitted.

16.1.3 Management of Hazardous IDW

Disposal of hazardous or suspected hazardous IDW (as defined in 40 CFR 261.30-261.33 or displaying the characteristics of ignitability, corrosivity, reactivity, or TC toxicity) must be specified in the sampling plan. Hazardous IDW must be disposed in compliance with USEPA regulations. If appropriate, these wastes may be taken to a facility waste treatment system. These wastes may also be disposed of in the source area from which they originated if state regulations permit.

If on-site disposal is not feasible, appropriate analyses must be conducted to determine if the waste is hazardous. If so, they must be properly contained and labeled. They may be stored on the site for a maximum of 90 days before they must be manifested and shipped to a permitted treatment or disposal facility. Weak acids and bases may be neutralized in lieu of disposal as hazardous wastes. Neutralized wastewaters may be flushed into a sanitary sewer.

If possible, arrangements for proper containment, labeling, transportation, and disposal/treatment of IDW should be anticipated beforehand.

Investigation derived wastes should be kept to a minimum. Most of the routine studies conducted by ESC should not produce any IDW that are hazardous. Many of the above PPE and DE wastes can be deposited in municipal dumpsters if care is taken to keep them segregated from hazardous waste contaminated materials. Disposable equipment can often be cleaned to render it nonhazardous, as can some PPE, such as splash suits. The volume of spent solvent waste produced during equipment decontamination can be reduced or eliminated by applying only the minimum amount of solvent necessary.

17.0 SAMPLING BIBLIOGRAPHY

17.1 Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, February 1, 1991, US EPA Region IV, Environmental Services Division.

17.2 RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (GPO #5500000260-6), US EPA, September 1986.

17.3 Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Office of Solid and Emergency Response, US EPA, November 1986.

17.4 Methods for the Determination of Organic Compounds in Drinking Water, EPA/600/4-88/039, December 1988.

17.5 Florida Department of Environmental Regulation (DER) Quality Assurance Section (QAS) Guidance Documents:
#89-01 - Equipment Material Construction, revised April 7, 1989
#89-02 - Field QC Blanks, revised April 28, 1989
#89-03 - Teflon® /Stainless Steel Bladder Pumps, revised May 10, 1988
#89-04 - Field Cleaning Procedures, revised August 10, 1989

17.6 DER Manual for Preparing Quality Assurance Plans, DER-QA-001/90, revised September 30, 1992.

17.7 NPDES Compliance Inspection Manual, United States Environmental Protection Agency, Enforcement Division, Office of Water Enforcement and Permits, EN-338, 1988.

17.8 Handbook for Monitoring Industrial Wastewater, United States Environmental Protection Agency, Technology Transfer, 1973.

17.9 EPA Primary Drinking Water Regulations, 40 CFR 141.

17.10 Rapid Bioassessment Protocols For Use in Streams and Rivers, United States Environmental Protection Agency, Office of Water, EPA/841/B-99-002.

17.11 Environmental Sampling and Analysis: A Practical Guide. Lawrence H. Keith, Ph.D., 1991. Lewis Publishers.

17.12 Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. U.S. Environmental Protection Agency, Office of Water, Washington DC. EPA/821/R-02/012

17.13 Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition. U.S. Environmental Protection Agency, Office of Water, Washington DC. EPA/821/R-02/013.

1.0 SIGNATORY APPROVALS

WET LAB QUALITY ASSURANCE MANUAL

APPENDIX IV TO THE ESC QUALITY ASSURANCE MANUAL

for

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Prepared by

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This manual discusses specific QA requirements for general analytical protocols to ensure analytical data generated from the Wet Chemistry Laboratory, or Wet Lab, are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the client with both routine and specialized services, field sampling, and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual Version 8.0.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Kenneth W. Buckley, with a B.S. degree in General Science, is the Laboratory Operations Manager. Mr. Buckley reviews and approves all data reduction associated with analyses in these areas and is responsible for the overall production of these laboratories; including the management of the staff and scheduling. Mr. Buckley has over 12 years of environmental laboratory experience. In his absence, Chad Pfalmer assumes responsibility for departmental decisions in the Wet Lab.

5.2 TRAINING

5.2.1 All new analysts to the laboratory are trained by a primary analyst or Manager according to ESC protocol. Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in Wet Lab analyses is demonstrated by acceptable participation in multiple proficiency testing programs (PTs) and daily Quality Control sample analyses. Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the laboratory has approximately 2800 square feet with roughly 750 square feet of bench area. There is an additional 400 square feet of storage space and the lighting standard is fluorescence. The air system is a 5-ton Trane package unit and a 10-ton Trane package unit with natural gas for heating. The laboratory reagent water is provided through the US Filter deionizer system with a Millipore Milli-Q Academic A-10 system for finished water. Waste disposal containers are located in the laboratory and Clean Harbors serves as ESC's waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods.
- ESC's laboratory safety guidelines are detailed in the *ESC Chemical Hygiene and Safety Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Matrices for Wet Lab environmental analyses include groundwater, wastewater, drinking water, soil, and sludge. The Wet Lab also performs analyses on sorbent media and air filters for Industrial Hygiene monitoring.
- Sample containers, preservation methods and holding times vary depending on analyses requested. Please see the determinative procedures for specific directions.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Wet Lab

This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*Serial #*	*Location*
Analytical Balance	Mettler	AT200	Balance 1	m26291	Wet Lab
Analytical Balance	Mettler	AG204 Delta Range	Balance 2	118420883	Wet Lab
Analytical Balance	Mettler	XP205	Balance 3	1129420141	Wet Lab
Autoanalyzer	Lachat	Quikchem 8000	Lachat 2	A83000-1027	Wet Lab
Autoanalyzer	Lachat	Quikchem 8000	Lachat 3	A83000-1638	Wet Lab
Autoanalyzer	Lachat	Quikchem 8500	Lachat 4	60900000341	Wet Lab
Autoanalyzer	Lachat	Quikchem 8500	Lachat 5	60900000342	Wet Lab
Autoanalyzer	Lachat	Quikchem 8500	Lachat 6	70500000452	Wet Lab
Autoanalyzer - digestor	Lachat	BD-46	DIG1	100700000-982	Wet Lab
Autoanalyzer - digestor	Lachat	BD-46	DIG2	1000700000-982	Wet Lab
Autoanalyzer - digestor	Lachat	BD-46	DIG1	1800-871	Wet Lab
Autoanalyzer - digestor	Lachat	BD-46	DIG2	1800-872	Wet Lab
Automated distiller	Skalar	SAN++ system	Kelada 1	9719	Wet Lab
Automated titrator	Metrohm	855 titrosampler	Titrando	3256	Wet Lab
Centrifuge	Thermo	Megafuge 40	Centrifuge	41123868	Wet Lab
Class “I” weights	Troemner	Serial #7944		7944	Wet Lab
COD Reactor	HACH	45600	COD1	10800	Wet Lab
COD Reactor	HACH	45600	COD2	10090C0036	Wet Lab
Conductivity Meter	ORION	MODEL 170	ATI Orion	32470007	Wet Lab
Distillation Unit - Cyanide	Environmental Express	Distillation 1	LMD1920-106	2270	Wet Lab

Distillation Unit - Cyanide	Environmental Express	Distillation 2	LMD1920-106	2271	Wet Lab
Distillation Unit - Cyanide	Environmental Express	Distillation 3	LMD1920-106	2272	Wet Lab
Distillation Unit - Phenol	Westco Scientific	Model EASY-DIST	Dist 1	1062	Wet Lab
Distillation Unit - Phenol	Westco Scientific	Model EASY-DIST	Dist 2	1198	Wet Lab
Flash Point Tester	Koehler	Pensky-Martens K16200	Manual	R07002510B	Wet Lab
Flash Point Tester	Koehler	Pensky-Martens K16201	Manual	R07002697B	Wet Lab
Hot Plate	Thermolyne Fisher	Type 2200	Hot	16237	Wet Lab
Hot Plate	Thermolyne Fisher	Type 2200	Hot	16240	Wet Lab
Ion Chromatograph	Dionex	ICS-2000	IC5	6050731	Wet Lab
Ion Chromatograph	Metrohm	850 Professional	IC2	1850000003190	Wet Lab
Ion Chromatograph	Dionex	ICS 1500	IC6	8100010	Wet Lab
Ion Chromatograph	Dionex	ICS 1500	IC7	8100267	Wet Lab
Ion Chromatograph	Dionex	ICS 2000	IC8	8090820	Wet Lab
Ion Chromatograph	Dionex	ICS 2100	IC9	10060822	Wet Lab
Ion Chromatograph	Dionex	ICS 2100	IC10	10091285	Wet Lab
Ion Chromatograph	Dionex	ICS 2100	IC11	11012204	Wet Lab
Ion Chromatograph	Dionex	ICS 2100	IC12	12020460	Wet Lab
Muffle Furnace	Thermolyne	(1) 30400	FURNACE	23231	Wet Lab
ORP Meter	YSI	ORP15	ORP	JC000114	Wet Lab
Oven - Drying	Blue M	Stabil-Therm	#1	NA	Wet Lab
Oven - Drying	Equatherm	D1576	#2	NA	Wet Lab
Oven - Drying	VWR	1305U	#3	4082804	Wet Lab
Oven - Drying	Equatherm	D1576	#4	10AW-3	Wet Lab
Oven - Drying	VWR	1305U	#5	4082104	Wet Lab
pH Meter	Fisher	AB15	AB15+	AB92329028	Wet Lab
pH Meter	Orion	410A	Orion	58074	Wet Lab
pH Meter	Fisher	AB15	AB15+	AB92325899	Wet Lab

Refrigerated Recirculator	Polyscience	Recirculator	Recirculator1	1282	Wet Lab
Refrigerated Recirculator	Polyscience	Recirculator	Recirculator2	1608	Wet Lab
Spectrophotometer (UV/Vis)	Hach	DR 5000	DR5000-1	1381711	Wet Lab
Spectrophotometer (UV/Vis)	Hach	DR 5000	DR5000-2	1326829	Wet Lab
Total Organic Carbon Analyzer	Shimadzu	Model TOC-VWS	TOC2	39830572	Wet Lab
Total Organic Carbon Analyzer	Shimadzu	TOC-VCPH	TOC3	H51304435	Wet Lab
Total Organic Carbon Analyzer	OI-Analytical	Aurora 1030	TOC4	E141788082	Wet Lab
Total Organic Halogen Analyzer	Mitsubishi	TOX-100	TOX2	1035	Wet Lab
Total Organic Halogen Analyzer	Mitsubishi	AOX-200	AOX1	E7B00107	Wet Lab
Turbidimeter	Hach	2100N	Turbidimeter1	941100000903	Wet Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

INSTRUMENT	***P. M. DESCRIPTION***	***FREQUENCY***
Analytical Balances	•Check with Class "I" weights	Daily
Analytical Balances	•Service/Calibration (semi-annual contract maintenance and calibration check)	Tolerance - ±0.1%
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semi-annually
Refrigerators & Incubators	•Maintenance service	As needed - determined by daily temperature performance checks
Water Bath	•Check thermometer vs. NIST	Once/year
Water Bath	•Remove from service when not maintaining temperature and send off for repair or replace	As needed
Flash Point Tester	•Check thermometer vs. certified traceable	Once/year
Lachat Autoanalyzer	•Check pump tubes, change valve flares	At least 1/month
Pensky Martens	•Check fuel level, refill	As needed
Pensky Martens	•Clean cup thoroughly	Between each test and after use
TOC	•Maintain manufacturer's service contract	Renew each year
Turbidimeter - Hach 2100A	•Illumination lamp or window (alignment and/or replacement)	Erratic or poor response
pH Meters	•Reference junction & electrode replacement	As needed
pH Meters	•Probe stored in KCl	At all times when not in use
pH Meters	•Other	As described in the manufacturer's O & M manual

8.3 STANDARDS AND REAGENTS

Table 8.3A lists standard sources, receipt, and preparation information. Table 8.3B is designed to provide general calibration range information. These ranges may change depending on regulatory requirements, procedural changes, or project needs. Table 8.3C indicates the procedures and frequency for the standardization of laboratory solutions used for titrations.

Table 8.3A: Standard sources, description and calibration information.
This table is subject to revision without notice

Instrument Group	Standard Source	How Received*	Source/ Storage	Preparation from Source	Lab Stock Storage	Preparation Frequency
Alkalinity, Acidity	Lab preparation	Acidity-matrix standard grade KHP	Room temp.	0.0500N	4°± 2°C	6 months
Ammonia-Nitrogen and Total Kjeldahl Nitrogen	Lab preparation	ACS grade NH4Cl	Room temp.	1,000ppm stock standard	Room temp.	Annually or sooner if check samples reveal a problem
Ammonia-Nitrogen and Total Kjeldahl Nitrogen				Working Standards	Not stored	Prepared fresh as needed
BOD	Lab preparation	As dry glucose and glutamic acid	Dessicator	150mg of each/L	4°± 2°C	Made fresh daily
COD	Lab preparation	Acid grade KHP	Dessicator	Stock solution (10,000ppm)	4°± 2°C	When absorbance of curve changes or check samples are out of control
Cyanide (Autoanalyzer)	Lab preparation	KCN	Reagent shelf	Stock solution (1,000ppm)	4°± 2°C	6 months. Working dilutions prepared daily as needed
Fluoride	Inorganic Standard. NSI Lab preparation	ACS grade KF	Room temp.	100ppm stock solution	Room temp.	1 year or as needed when reference standard fails
Fluoride				Dilute standards	Not stored	Prepared fresh daily
Hardness	Lab preparation	Chelometric Std. $CaCO_3$	Room temp.	1mg/mL as CaCO3	Room temp.	Annually or sooner if check samples reveal a problem
IC (Chloride, Nitrate, Nitrite, Bromide, Sulfate, Fluoride)	Commercial source	Varies	4°± 2°C	Working Standards as needed per analyte	4°± 2°C	6 months or sooner if check samples reveal a problem
IC (Chloride, Nitrate, Nitrite, Bromide, Sulfate, Fluoride)	Inorganic Standards	Varies	4°± 2°C	Working Standards as needed per analyte	4°± 2°C	Midpoint standard prepared weekly or sooner if necessary
IC (Chloride, Nitrate, Nitrite, Bromide, Sulfate, Fluoride)	NSI (2nd source)	Varies	4°± 2°C	Working Standards as needed per analyte	4°± 2°C	Prepared weekly or sooner if necessary
MBAS	Lab preparation	LAS Reference Material	4°± 2°C	1,000mg/mL working standards	4°± 2°C Wet Stored	6 months or when check standards are out of control. Prepared fresh.
Nitrite-Nitrate (autoanalyzer)	Lab preparation	ACS grade KNO3	Reagent shelf	Stock solution (1000ppm)	4°± 2°C	When absorbance of curve changes or check samples are out of

Table 8.3A: Standard sources, description and calibration information.

This table is subject to revision without notice

Instrument Group	Standard Source	How Received*	Source/ Storage	Preparation from Source	Lab Stock Storage	Preparation Frequency
						control
pH Meter	Commercial Source	pH 4.0 Buffer	Room temp.	No prep required	NA	Annual/Expiration Date
pH Meter	Commercial Source	pH 7.0 Buffer	Room temp.	No prep required	NA	Annual/Expiration Date
pH Meter	Commercial Source	pH 10.0 Buffer	Room temp.	No prep required	NA	Annual/Expiration Date
Phenols (autoanalyzer)	Lab preparation	ACS Certified Phenol	Reagent shelf	Stock solution (1000ppm)	4°± 2°C	Every month. Working solutions prepared daily as needed.
Phosphate	(H2O) - Prepared in Lab Total Phos. (soils) RICCA, ERA	KH2PO4	Reagent shelf	Stock solution (50ppm as P)	Room temp.	When absorbance of curve changes or check samples are out of control. Working solutions prepared daily as needed.
Specific Conductivity Meter	NSI-Primary	ACS Certified KCl	Room temp.	Working Standard (0.01M)	Room temp.	As needed
Specific Conductivity Meter	ERA-2nd Source	ACS Certified KCl	Room temp.	Working Standard (0.01M)	Room temp.	As needed
Sulfate	Inorganic Standards, NSF Prepared in Lab	Anhydrous Na2SO4	Reagent shelf	Stock solution (100ppm)	Room temp.	When visible microbiological growth or check samples are out of control
Turbidimeter	Commercial Source Hach	Hach	Room temp.	No prep required	NA	Checked daily against Formazin Standards
pH Meter	Commercial Source	pH 1.0 Buffer	Room temp.	No prep required	NA	Annual/Expiration Date
pH Meter	Commercial Source	pH 13.0 Buffer	Room temp.	No prep required	NA	Annual/Expiration

TABLE 8.3B: WORKING STANDARD CALIBRATION	
Analysis	**Calibration Standard**
Alkalinity, Acidity- Titrimetric	Primary standard grade Na_2CO_3.
Alkalinity - Methyl orange Autoanalyzer	Primary standard grade Na_2CO_3: 0, 10, 25, 50,100, 250, 375, 500 mg/L
BOD	D.O.-Barometric pressure/temp., Glucose and Glutamic acid reference standard.
Bromate IC	Low Range – 5.0, 10, 20, 30, 50, 100 ug/L
Bromide IC	Range –1.0, 5.0, 10, 50, 100, mg/L
Chlorate IC	Low Range – 5.0, 10, 20, 30, 50, 100 ug/L High Range – 10, 20, 50, 100, 200, 400, 600 ug/L
Chloride IC	Range –1.0, 5.0, 10, 50, 100, mg/L1
Conductivity	Standard KCl solution: 1413
Cyanides	Blank, 0.0025 – 0.40ppm. Distill one standard as check with each batch.
COD	KHP (Potassium hydrogen phthalate) standards 20 – 1000 mg/L
Chromium – Hexavalent (Colorimetric)	Blank, 0.0101, 0.0202, 0.0505, 0.1010, 0.2525, 0.5050, 1.010 mg/L
Chromium – Hexavalent (IC)	Blank, 0.5, 1.0, 2.0, 10, 20, 50, 100 ug/L
Fluoride – IC	Range –0.10, 0.50, 1.0, 5.0, 10.0, mg/L
Hardness	$CaCO_3$, chelometric standard.
Hardness (Colorimetric)	Range – 30, 50, 60, 100, 150, 200, 300 mg/L
MBAS	LAS reference material: 0.0, 0.1, 0. 5, 1.0, 1.5, 2.0 mg/L
Nitrogen-Ammonia – Autoanalyzer	Calibration standards: 0, 0.10, 0.50, 1.0, 2.0, 5.0, 10, 20 mg/L
Nitrogen-Nitrate, Nitrite – Autoanalyzer	Blank, 0.1, 0.50, 1.00 5.0, 7.0, 10.0 mg/L
Nitrogen-Nitrate – IC	Range –0.10, 0.50, 1.0, 5.0, 10.0, mg/L
Nitrogen-Nitrite – IC	Range –0.10, 0.50, 1.0, 5.0, 10.0, mg/L
Orthophosphate, Total Phosphate	Blank, 0.025, 0.10, 0.25, 0.50, 0.75, 1.0mg/L diluted from standard KH_2PO_4
Perchlorate	Range – 0.5, 1.0, 3.0, 5.0, 10, 20, 25 mg/L
pH	Buffers1.0, 4.0, 7.0, 10, 13
Phosphate, Total	Range – 0.0, 0.1, 0.5, 1.0, 2.5, 5.0 mg/L
Phosphate – IC	Range –0.10, 0.50, 1.0, 5.0, 10.0, 15.0, 20.0 mg/L
Phenols (chloroform ext.)	Blank 0.04, 0.05, 0.10, 0.50, 1.0, 2.0mg/L Distill one standard with each batch
Solids	Gravimetric balance calibrated charts, checked with Class “I” weights in range of sample tare weights.
Sulfate – IC	Range –1.0, 5.0, 10, 50, 100, 150, 200 mg/L
Sulfide (Colormetric)	Range –0.0, 0.05, 0.1, 0.5, 1.0, 1.5, 2.0 mg/L
Sulfite	Titration
TKN	Range – 0.0, 0.1, 0.5, 1.0, 2.5, 5.0, 10, 20 mg/L
Turbidity	Range –0, 20, 200, 1000, 4000NTU
TOC	Range –0, 1.0, 2.5, 5.0, 7.5, 10, 20, 50, 75, 100 mg/L
ToX	Cell checks at 1, 20, 40 ug

TABLE 8.3C: STANDARDIZATION OF TITRATION SOLUTIONS		
Solution	**Primary Standard**	**Frequency**
0.0200 N NaOH	0.050 N KHP	Daily as needed
0.0200 N H_2SO_4	Freshly prepared and standardized NaOH (from KHP standard)	6 months or with each new batch
0.0141 N Hg $(NO_3)_2$	Standard NaCl solution 500 ug Cl/ml	Daily as used
0.0100 M EDTA	Standard $CaCO_3$ solution 1 mg $CaCO_3$/liter	Daily as used

8.4 INSTRUMENT CALIBRATION

Total Organic Carbon Analyzer (TOC) – SOP Number 340356A

The TOC standard curve is prepared using a minimum of five standards. Linear regression is used for quantitation with the correlation coefficient being at least 0.995. The calibration range is 1.0mg/L to 100mg/L. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recover within 10% of the expected value for each analyte.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±15% of the expected concentration.

Total Organic Halogen Analyzer (TOX) – SOP Number 340360

The cell performance of the TOX analyzer is verified at the beginning of each analytical sequence in the low, mid and high ranges. The verifications must recover within 3% of the expected target value. The instrument performs a linear regression using the values determined with the required correlation coefficient being at least 0.995. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recover within 10% of the expected value for each analyte.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±15% of the expected concentration.

Anions by Ion Chromatography – SOP 340319

Quadratic Fit is the primary method of quantitation; however Linear Regression is required for sample analyzed in conjunction with the Ohio VAP program. When using quadratic fit a minimum of six standards are used. If linear regression is used for quantitation, a minimum of five standards is used and the correlation coefficient must be at least 0.995 for each analyte of interest. The calibration range varies depending upon the analyte(s) to be determined. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recover within 10% of the expected value for each analyte, except during the analysis of groundwater and soil using EPA Method 9056 that must recover within 5%.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±10% for water samples and 15% of the expected concentration for soil samples.

Auto-Analyzer (Lachat) – Various SOPs

The Autoanalyzer calibration curve is prepared using a minimum of five standards. For most analyses, linear regression is used for quantitation with the correlation coefficient being at least 0.995. The calibration range varies depending upon the analyte to be determined. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. Routinely, the CCV must recover within 10% of the expected value for each analyte, but is dependent on the analyte of concern, the matrix of the sample and the determinative method.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±15% of the expected value, except for cyanide, ammonia, total phosphorus, NO2NO3 where ±10% applies.

Gravimetric Analyses – Various SOPs

Gravimetric analyses are performed using several different published methods, including TDS, TSS, TVDS, TS, TVS, VSS, Settleable Solids, Total Particulates, Respirable Particulates. Calibration for these methods require use of Class I weights and a properly performing and verified balance. Where possible, laboratory control standards are analyzed in conjunction with field sample analysis to verify that the analytical process is performing accurately. Sample duplicate analyses also provide verification that the analytical process is performing as required.

Perchlorate in Drinking Water – ESC SOP 340370

The Ion Chromatograph calibration curve is prepared using a minimum of five standards. The instrument performs a linear regression using the values determined with the required correlation coefficient being at least 0.995. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recover within 15% of the expected value for each analyte.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±15% of the expected concentration.

8.5 ACCEPTANCE/REJECTION OF CALIBRATION

The initial calibration curve is compared with previous curves for the same analyte. The curve is checked for linearity and the response must be within 10% of the previous curve. All new standard curves are immediately checked with a laboratory control standard from a separate source than that used for calibration. All curves are visually reviewed to ensure that acceptable correlation represents linearity. Calibration curves may be rejected for nonlinearity, abnormal sensitivity, or poor response of the laboratory control standard. Specific criteria for each instrument are outlined in Table 8.5.

Continuing calibration is performed following every tenth sample. If a check standard does not perform within established criteria then the instrument is evaluated to determine the problem. Once the problem is corrected, all samples between the last “in control” sample and the out of control check are re-analyzed.

TABLE 8.5: INSTRUMENT CALIBRATION

Instrument (Analysis)	Calibration Type	Number of Standards	Type of Curve	Acceptance/Rejection Criteria	Frequency
pH Meter*	Initial	5 (buffers) 1 reference buffer	Log.	Third pH of a different value buffer must read within 0.05 units of true value	Daily as used
	Continuing	1 buffer (may be any certified buffer)		Buffer solution must read within 0.05 units of true value	Every 10th sample; Field**
Conductivity Meter*	Initial	1	1 point	Calculation of cell constant between 0.95 - 1.05	Daily as used
	Continuing	1		Must be within 5% of true value	Every 10th sample; Field**
Turbidimeter *	Initial	5	Linear	Formazin-confirmed Gelex standards in appropriate range. Check with second standard must be within 5%	Daily as used
	Continuing	1 reference of different value, 1 (high-level)		Must be within 5% of true value	Every 10th sample; Field**
UV/VIS Spec.	Initial	At least 5 standards calibration standards 2 laboratory control standard	Linear	Calibration Curve must have a correlation of 0.995 or better Must be within ± 15% of the calibration curve.	Daily as used Daily as used
	Continuing	1 mid-level reference std.		Must be within 90 – 110%	Every 10th sample
Total Organic Halogen Analyzer	Initial	3 calibration standards 1 laboratory control standard	Linear	Calibration Curve must have a correlation of 0.995 or better Laboratory control standard must agree within ± 15% of calibration curve	Daily as used Daily as used
	Continuing	1 mid-level reference std.		Must be within 90 – 110%	Every 10th sample
Total Organic Carbon Analyzer	Initial	5 calibration standards 2 laboratory control standard	Linear	Calibration Curve must have a correlation of 0.995 or better Laboratory control standard must agree within ± 15% of calibration curve	Every 6 months or as needed Daily as used
	Continuing	1 mid-level reference std.		Must be within 90 – 110%	Every 10th sample

Note: ESC defines a "laboratory control standard" as a standard of a different concentration and source than those stock standards used for calibration.
*This equipment is also calibrated and used in the field.
**Field equipment must be checked every 4 hours and at the end of the day.

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent grade water is obtained from either a Barnstead NANOpure Diamond system or the Millipore Milli-Q Academic A-10 system.

9.2 GLASSWARE WASHING AND STERILIZATION PROCEDURES

General

Routine laboratory glassware is washed in a non-phosphate detergent and warm tap water. Before washing all labeling and large deposits of grease are removed with acetone. Glassware is then rinsed with: tap water, "No Chromix" solution, tap water, and deionized (DI) water. Glassware is stored in designated drawers or on shelves, inverted when possible. All glassware is rinsed with the required solvent, prior to use. DI water is then used as a precaution against airborne contamination

Phosphate Glassware

Glassware involved in phosphate analysis is marked and segregated. All labels and markings are removed from the glassware prior to washing. The glassware is then washed using hot water and a non-phosphorus detergent. It is then rinsed thoroughly in hot water followed by a rinse in DI water. It is rinsed in 1:1 HCl followed by a final rinse of DI water. If the phosphate glassware has not been used recently, it is the responsibility of the analyst to rinse the glassware with warm 1+9 hydrochloric acid prior to use.

Nutrients and Minerals Glassware

All labels and markings are removed from the glassware prior to washing. The glassware is then washed using hot water and detergent. It is then rinsed thoroughly in hot water followed by a rinse in DI water. It is rinsed in 1:1 HCl followed by a final rinse of DI water. Immediately prior to use, the ammonia glassware is rinsed in DI water. Routine blanks are run on ammonia glassware to ensure that the detergent is contaminant free.

Non-Metals (CN, BOD, COD) Glassware

All labels and markings are removed prior to washing. The glassware is soaked in hot soapy water followed by a thorough rinse with hot tap water. A final rinse of DI water is then performed.

BOD analysis is performed in disposable, pre-sterilized bottles. In the event that glass bottles must be used, the BOD glassware is washed in a commercial laboratory dishwasher using a phosphate free detergent, followed by a nitric acid rinse, with a final rinse of laboratory DI water.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the Wet Lab can be found in the following table:

TABLE 10.1: WET LAB DEPARTMENT SOPs

This table is subject to revision without notice

SOP #	Title
340300	Acidity
340301	Alkalinity (Titrimetric)
340302	Alkalinity - Lachat
340303	Biochemical Oxygen Demand
340305	Chlorine, Total Residual
340306	Corrosivity
340307	Cyanide- All Forms (Colorimetric Automated UV) - Lachat
340309	Chemical Oxygen Demand
340310	Color by Visual Comparison
340313	Density (Specific Gravity)
340317	Total Hardness by Lachat
340317	Total Hardness (mg/l as CaCO3) - (Titrimetric)
340318	Hexavalent Chromium (Colorimetric) Water/Soil
340319	Ion Chromatography - Anions
340325	MBAS (Methylene Blue Active Substances)
340327	Ammonia, Phenolate (Lachat)
340328	Organic Nitrogen
340331	Threshold Odor Test
340333	Nitrate/Nitrite (Lachat Autoanalyzer)
340334	Paint Filter Test
340335	pH
340336	Phenol - 4AAP (Lachat Autoanalyzer)
340338	Orthophosphate Colorimetric
340338	Total Phos. Colorimetric
340339	Reactivity
340340	Reactive Cyanide/Sulfide Distillation
340342	Specific Conductance

SOP #	Title
340344	Sulfide (Colorimetric Methylene Blue)
340344	Sulfide Acid-soluble,and acid-insoluble
340345	Sulfite
340346	Settleable Solids
340347	Total Dissolved Solids
340348	Total Suspended Solids (Non-Filterable Residue)
340349	Total Solids/Percent Moisture
340350	Total Volatile Solids
340352	Total Kjeldahl Nitrogen
340356	Total Organic Carbon In Soils (loss of weight on ignit.)
340356	TOC for Drinking Water only
340356	Total Organic Carbon (TOC) and Total Inorganic Carbon (TIC)
340357	Ignitability
340357	Ignitability
340359	UV254
340360	TOX (total organic halides)
340361	Ferrous Iron
340362	Heat of Combustion
340365	Particles Not Otherwise Regulated, Total (PNOR)
340366	Oxidation Reduction Potential
340367	Extractable Organic Halides
340368	TOC in Soil (Walkley-Black)
340369	Carbon Dioxide by Calculation
340370	Perchlorate in DW
340371	Chlorine in Oil
340372	Hexavalent Chromium in Water by IC
340373	Organic Matter (FOM) and Fractional Organic Carbon (FOC)
340374	Total Volatile Dissolved Solids (TVDS)
340375	Hexavalent Chromium in Air by IC
340376	Total Organic Halides in Oil
340377	Manual Nitrocellulose Analysis
340378	Volatile Suspended Solids
340379	Guanidine Nitrate by IC

11.0 QUALITY CONTROL CHECKS

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

11.1 ESC participates in proficiency testing (PTs) in support of various laboratory accreditations/recognitions. Environmental samples are purchased from Environmental Resource Associates (ERA). The WS, WP and solid matrix studies are completed every 6 months.

11.2 Initial Demonstrations of Capability (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing Demonstration of Capability (CDOCs) must be updated at least annually. The associated data is filed within the department and available for review.

11.3 Where appropriate, Matrix Spike and Matrix Spike Duplicates are performed on each batch of samples analyzed, depending on analytical method requested.

11.4 A Laboratory Control Sample (LCS) is analyzed once per batch of samples. Where appropriate, an LCS Duplicate may also be analyzed.

11.5 Where appropriate, a method preparation blank is performed per batch of samples processed. If one-half the reporting limit [RL] is exceeded, the laboratory shall evaluate whether reprocessing of the samples is necessary, based on the following criteria:

- The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparation batch or
- The blank contamination is greater than 1/10 of the specified regulatory limit.

The concentrations of common laboratory contaminants shall not exceed the reporting limit. Any samples associated with a blank that fail these criteria shall be reprocessed in a subsequent preparation batch, except when the sample analysis resulted in non-detected results for the failing analytes.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in ESC SOP #030201, *Data Handling and Reporting.* The Quality Control Department performs the secondary review of the data package using the ESC SOP #030227, *Data Review.* The QC Reviewer verifies that the analysis has performed as required and meets method criteria, all associate data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required flags on test reports, etc.)

TABLE 12.1: Data Reduction Formulas

PARAMETER	FORMULA
Acidity, Alkalinity	$\frac{\text{mL titrant x normality titrant x 50,000}}{\text{mL sample}}$
BOD, 5-day	$\frac{\text{Initial D.O. - Final D.O. - CF}}{\text{\% Dilution Sample}}$ *Calculations are performed by computer software*
Boron, COD, Sulfate	Concentration from curve x dilution factor
Nitrogen-Nitrate, Nitrite, Nitrogen-Nitrite, Ortho and Total Phosphate, Phenols, Chloride	Calculated by computer software as provided by Lachat Corp.
Fluoride**, Nitrogen-Ammonia**, Nitrogen-Total Kjeldahl**	Calculated by computer software as provided by Lachat Corp.
Anions	Calculated by computer software as provided by Dionex
Conductivity*, pH, Turbidity,	Directly read from instrument
Cyanide, Total and Amenable	$\frac{\text{µg from standard curve x mL total volume absorbing solution}}{\text{mL volume sample x mL volume of absorbing solution colored}}$ *Calculated by software as provided by Lachat Corp.*
Solids, Total and Total Dissolved	$\frac{\text{((mg wt of dried residue + dish) - mg wt of dish) x 1000}}{\text{mL sample}}$
Solids, Total Suspended	$\frac{\text{((mg wt of dried residue + filter) - mg wt of filter) x 1000}}{\text{mL sample}}$

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.3 by method for current QC targets, controls and current reporting limits.

12.3 REPORTING

Reporting procedures are documented in *SOP 030201 Data Handling and Reporting.*

Inorganic Control Limits: Inorganic QC targets are statutory. The laboratory calculated limits verify the validity of the regulatory limits. The Wet Lab QC targets for all inorganic analyses are within the range of $\pm$ 5 to 15% for accuracy, depending on determinative method requirements, and, where applicable, $\leq$20 RPD for precision, unless laboratory-generated data indicate that tighter control limits can be routinely maintained. When using a certified reference material for QC sample analysis, the acceptance limits used in the laboratory will conform to the provider's certified ranges for accuracy and precision.

Table 12.3: QC Targets for Wet Lab Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppb)
Acidity	SM 2310B	w	85 - 115	<20	1000
Alkalinity	SM 2320	w	85 - 115	<20	10000
Ammonia	350.1, SM 4500-NH3-H	w	–90-110	<20	100
Ammonia	350.1 (mod.)	s	Certified Values	<20	500
Bromide	300.0/9056/9056A	w	90 - 110	<20	1000
Bromide	SM 4110B	w	90 - 110	<20	1000
Bromide	300.0	s	Certified Values	<20	10000
Chloride	300.0/9056/9056A	w	90 - 110	<20	1000
Chloride	SM 4110B	w	90 - 110	<20	1000
Chloride	300.0	s	Certified Values	<20	10000
Color	SM 2120-E	w	n/a	<20	1 CU
Conductivity	120.1/9050A, 2510	w	85 - 115	<20	1000
Cyanide	335.3, 335.4, 335.2 (CLP-M), 9012A	w	90 - 110	<20	5
Cyanide	SM 4500-CN-E	w	90 - 110	<20	5
Cyanide	EPA 9012A	s	Certified Values	<20	250
Ferrous Iron	3500FE B	w	85 - 115	<20	50
Fluoride	300.0/9056/9056A	w	90 - 110	<20	100
Fluoride	SM 4110B	w	90 - 110	<20	100
Fluoride	9056A	s	Certified Values	<20	1000
Hardness	130.1	w	85 - 115	<20	30000
Hardness	SM 2340	w	85 - 115	<20	1000
Hexavalent Chromium	SM3500 CrD/7196A	w	85 - 115	<20	10
Hexavalent Chromium	7196A	s	Certified Values	<20	2000
Ignitability	1010	ws	±3 degrees C	<20	n/a
Methylene Blue Active Substances	5540C SM20th	w	85 - 115	<20	100
Nitrate-Nitrite	300	w	90 - 110	<20	100
Nitrate-Nitrite	SM 4110B	w	85 - 115	<20	100
Nitrate-Nitrite	9056/9056A	w	90-110	<20	100
Nitrate-Nitrite	9056/9056A	s	Certified Values	<20	1000
Nitrite	300.0/9056/9056A	w	90 - 110	<20	100
Nitrite	SM 4110B	w	90 - 110	<20	100
Nitrite	300.0/9056/9056A	s	Certified Values	<20	1000
Nitrate	300.0/9056/9056A	w	90 - 110	<20	100
Nitrate	SM 4110B	w	90 - 110	<20	100
Nitrate	300.0/9056/9056A	s	Certified Values	<20	1000
Moisture	Karl Fisher	ws	n/a	<20	n/a
pH	SM 4500-H, 9040B	w	n/a	<1	n/a
pH	9045C	s	n/a	<1	n/a

Table 12.3: QC Targets for Wet Lab Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppb)
Phosphate (ortho)	SM 4500-P	w	85 - 115	<20	25
Phosphorous/Total	365.4, SM 4500-P	w	–90-110	<20	25
Phosphorous/Total	365.4	s	Certified Values	<20	1000
Phosphorous/Total	9056/9056A	s	Certified Values	<20	1000
Residual Chlorine	SM 4500Cl G 20th	w	90 - 110	<20	100
Residue, Total (TS)	SM 2540-B, SM2540-G	w	85 - 115	<20	1000
Residue, Filterable (TDS)	SM 2540-C	w	95 - 105	<20	1000
Residue Non-Filterable (TSS)	SM 2540-D	w	95 - 105	<20	1000
Residue, Total Volatile (TVS)	160.4, SM 2540-E, SM2540-G	w,s	80 - 120	<20	1000
Sulfate	300.0/9056/9056A	w	90 - 110	<20	5000
Sulfate	SM 4110-B	w	90 -110	<20	5000
Sulfate	300.0/9056/9056A	s	Certified Values	<20	50000
Sulfide	SM 4500S2 D 20th	w	85 - 115	<20	100
Sulfite	SM 4500-SO3	w	85 - 115	<20	500
Total Kjeldahl Nitrogen	351.2	w	–90-110	<20	500
Total Kjeldahl Nitrogen	351.2	s	Certified Values	<20	50000
Total Organic Carbon	415.1, SM 5310B&C, 9060	w	85 - 115	<20	1000
Total Organic Carbon	LOI	s	Certified Values	<20	10000
Dissolved Organic Carbon	415.1, SM 5310B&C, 9060	w	85 - 115	<20	1000
Total Inorganic Carbon	415.1, SM 5310B&C, 9060	w	85 - 115	<20	1000
Total Organic Halogens	9020A, SM 5320B	w	85 - 115	<20	10
EOX	9023	s	85 - 115	<20	20000
Total Phenol	420.2	w	85 - 115	<20	50
Total Phenol	9066	s, ws	Certified Values	<20	50
Turbidity	180.1, SM 2130	w	n/a	<20	1 NTU

13.0 CORRECTIVE ACTIONS

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The reason for the nonconformance is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CAR is kept on file by the QA department. Corrective action procedures are documented in SOP 030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these control limits are exceeded, corrective action must be taken. Calculated sample spike control limits are also used.

All samples and procedures are governed by ESC's quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP.

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria take precedence.

13.2.2 Calibration Verification Criteria Are Not Met: Inorganic Analysis

Rejection Criteria - See Table 8.5.

Corrective Action - If a standard curve linearity is not acceptable and/or the absorbance for specific standard(s) is not analogous to historic data, the instrument settings, etc. are examined to ensure that nothing has been altered, clogged, etc. Check the standard curve for linearity and re-analyze the standards once. If the failure persists, the working standards will be made fresh, intermediate dilutions will be re-checked and the instrument will be re-calibrated. If a problem persists, the group supervisor or QA Department is notified for further action.

If the initial reference check sample is out of control, the instrument is re-calibrated and the check sample is re-analyzed. If the problem continues the check sample is re-prepared. If the problem still exists then the standards and reagent blank are re-prepared. If the problem persists, the group supervisor or QA Department is notified for further action.

13.2.3 Out Of Control Blanks: Applies to Method, Trip, Rinsate & Instrument Blanks

Rejection Criteria - Blank reading is more than twice the background absorbance or more than 1/2 RL.

Corrective Action - Blanks are re-analyzed and the response is assessed. Standard curves and samples are evaluated for any obvious contamination that may be isolated or uniform throughout the run. If necessary, reagents are re-prepared. Field sample analyses are not started until the problem is identified and solved. If samples have already been partially prepared or analyzed, the group leader or QA Department will be consulted to determine if data needs to be rejected or if samples need to be re-prepped.

13.2.4 Out Of Control Laboratory Control Standards (LCS)

Rejection Criteria - If the performance of associated laboratory control sample(s) is outside of lab-generated control limits calculated as the mean of at least 20 data points $\pm$ 3 times the standard deviation of those points. (Listed in Section 12).

Corrective Action - Instrument settings are checked, LCS standard is re-analyzed. If the LCS is still out of control, re-calibration is performed, and samples affected since the last "in control" reference standard are re-analyzed. The group leader, lab supervisor, or QA Department will be consulted for further action.

13.2.5 Out Of Control Matrix Spike Samples

Rejection Criteria - If either the MS or MSD sample is outside the established control limits from accuracy charts on matrix spike samples of a similar matrix (i.e., water, solid, etc). Limits are calculated as the mean ± three times the standard deviations.

Corrective Action - Spiking technique is assessed to ascertain if the sample has been spiked correctly. The spiked sample should be 1 – 5 times the concentration of the client sample; otherwise, the percent recovery (%R) or relative percent difference (RPD) of the MS/MSD should be flagged as not meaningful or usable The sample is re-spiked and re-analyzed, along with several other similar samples in subset. If an "out of control" situation persists, sample matrix interference is indicated. Samples to be analyzed by standard additions are prepared (where appropriate), and the group leader, lab supervisor, or QA Department is notified.

13.2.6 Out Of Control Duplicate Samples

Rejection Criteria - Lab-generated maximum RPD limit (as listed under precision in Section 12)

Corrective Action - Instrument and samples checked to see if precision variance is likely (i.e., high suspended solids content, high viscosity, etc.). They are re-analyzed in duplicate and samples just preceding and following the duplicated sample are re-analyzed. If problem still exists, lab supervisor or QA Department is notified to review the analytical techniques.

13.2.7 Out Of Control Matrix Spike Duplicates

These QC samples can be out of control for accuracy, precision, or both. The appropriate corrective actions listed for either matrix spikes, duplicate samples, or both are followed.

Analysis-specific corrective action lists are available for each type of analysis performed by ESC.

13.2.8 Out Of Control Calibration Standards: ICV, CCV, SSCV

Rejection Criteria - If the performance is outside of method requirements.

Corrective Action - Instrument settings are checked, calibration verification standard is reanalyzed. If the standard is still out of control, re-calibration is performed, and samples affected since the last "in control" reference standard are re-analyzed. The group leader, lab supervisor, or QA Department will be consulted for further action.

14.0 RECORD KEEPING

Record keeping is outlined in SOP *#010103 Document Control and Distribution,* SOP *#030203 Reagent Logs and Records* and SOP *#030201 Data Handling and Reporting*

All calibration data and graphs generated for wet chemistry are kept in a calibration notebook with the following information: date prepared, calibration concentrations, correlation, and analyst initials. The analyst reviews the calibration and evaluates it against acceptance criteria before placing it in the calibration notebook. Data on initial and continuing reference standards, as well as matrix spikes and duplicates, are entered in the QC box generated on each analysis page. If a test allows the use of a previously established calibration curve then the calibration check standard is reviewed against acceptance criteria and if acceptable, analysis can proceed. In this situation the calibration date is referenced so that the curve can be easily reviewed, if necessary.

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual *Version 8*.0.

1.0 SIGNATORY APPROVALS

Metals Department
QUALITY ASSURANCE MANUAL

APPENDIX V TO THE ESC
QUALITY ASSURANCE MANUAL

for

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NOTE: The QAM has been approved by the following people. A signed cover page is available upon request

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that data generated from the Metals Laboratory is scientifically valid and is of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the client with both routine and specialized services, field sampling and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual Version 8.0.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Kenneth W. Buckley, with a B.S. degree in General Science, is the Laboratory Operations Manager. Mr. Buckley reviews and approves all data reduction associated with analyses in these areas and is responsible for the overall production of these laboratories; including the management of the staff and scheduling. Mr. Buckley has 12 years of environmental laboratory experience. In his absence, LaKeia Layne, with a M.S. degree in Biology and five years of environmental laboratory experience, assumes responsibility for Metals Department decisions.

5.2 TRAINING

The primary analyst or Manager trains all new analysts to the laboratory according to ESC protocol. Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in metals analysis and preparation is also demonstrated by acceptable participation in multiple proficiency testing programs (PTs) and daily Quality Control sample analyses. Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the analysis laboratory has approximately1200 square feet with roughly 90 square feet of bench area. The main area of the metals prep laboratory has approximately 1200 square feet with 232 square feet of bench area. The main area of the Mercury/TCLP laboratory has approximately 1272 square feet with 136 square feet of bench area. The lighting standard in all three labs is fluorescence. The air system is a 15-ton make-up unit plus 15-ton HVAC with electric heat. The laboratory reagent water is provided through the US Filter deionizer system. Waste disposal containers are located in the laboratory and Clean Harbors serves as ESC's waste disposal company. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods.
- ESC's laboratory safety guidelines are detailed in *the ESC Chemical Hygiene and Safety Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Matrices for metals analysis are as follows: groundwater, wastewater, drinking water, soil, sludge, paint chips, wipes, filters, and leachates.
- Sample containers, preservation methods and holding times:
  - Ø Glass and plastic containers are acceptable for all elements except Boron and Silicon. Plastic must be used for Boron and Silicon.
  - Ø Water Samples that are analyzed for dissolved metals must be filtered using a 0.45µm pore membrane. Water samples for total metals are not filtered. All water samples are acidified with 1+1 nitric acid to a pH<2. Filtered water samples (dissolved metals) are preserved immediately after filtration. All other water samples are preserved immediately after sampling. Water samples are not refrigerated prior to analysis.
  - Ø Paint chips, dust wipes and filters do not require preservation.
  - Ø Soil samples are stored at $4 \pm 2^{o}C$ and do not require acid preservation.
  - Ø Hold times for all metals, except Mercury, are 180 days. Mercury has a hold time of 28 days.

8.0 EQUIPMENT

Instrument Software

- § PE ELAN ICPMS - PE - ICP Winlab - Used for calibration, calculation, QC review, diagnostics, data storage
- § Perkin Elmer ICP Optima DV - PE - ICP Winlab - Used for calibration, calculation, qc review, diagnostics, data storage

NOTE: All purchased software that is used in conjunction with software specific instruments is guaranteed by the supplier to function as required. The supplier of the software performs all troubleshooting or software upgrades and revisions.

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Metals Analysis and Preparation
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Name*	*#*	*Serial number*	*Location*
Balance- Top Loading	Trobal	AGN100		1	701001026	Metals Prep Lab
Balance - Top Loading	Mettler Toledo	PB3002-5		1	1119070828	Metals Prep Lab
Balance - Top Loading	Mettler Toledo	PB3002-5		1	71242213216	Mercury Lab
Balance - Top Loading	Mettler Toledo	PB3002-5		1	1121462199	Metals Prep Lab
Hot Block	Env. Express	SC154	C	1	3994CEC1880	Metals Prep Lab
ICPMS with autosampler	Perkin Elmer	ELAN DRC-e ASX-520	ICPMS4	1	AH13650804	Metals Lab
ICPMS with autosampler	Perkin Elmer	ELAN DRC-e ASX-520	ICPMS3	1	AH00110504H	Metals Lab
ICPMS with autosampler	Perkin Elmer	ELAN 9000 ASX-520	ICPMS5	1	AJ12270805	Metals Lab
ICPMS with autosampler	Perkin Elmer	ELAN DRC II ASX-520	ICPMS6	1	AI13820805H	Metals Lab
ICP - Simultaneous with autosampler	Perkin Elmer	Optima 8300DV ASX-520	ICP9	1	078N2042101	Metals Lab
ICP - Simultaneous with autosampler	Perkin Elmer	Optima 5300DV ASX-510	ICP5	1	077N5041802	Metals Lab
ICP - Simultaneous with autosampler	Perkin Elmer	Optima 5300DV ASX-510	ICP6	1	077N5091002	Metals Lab
ICP - Simultaneous with autosampler	Perkin Elmer	Optima 5300DV ASX-520	ICP7	1	077C6110602	Metals Lab
ICP - Simultaneous with autosampler	Perkin Elmer	Optima 7300	ICP8	1	077C0111203	Metals Lab

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Metals Analysis and Preparation ***This table is subject to revision without notice***						
Item	***Manufacturer***	***Model***	***Name***	***#***	***Serial number***	***Location***
Hot Block	CPI	Mod Block	HGA	1	004412	Mercury Lab
Hot Block	CPI	Mod Block	HGB	1	604443	Mercury Lab
Hot Block	CPI	Mod Block	MPA	1	4430	Metals Prep Lab
Hot Block	CPI	Mod Block	MPB	1	4434	Metals Prep Lab
Mercury Auto Analyzer	Perkin Elmer	(1) FIMS 400	I	1	4545	Mercury Lab
Mercury Auto Analyzer	Perkin Elmer	(1) FIMS 100	III	1	110156051101	Mercury Lab
Mercury Auto Sampler	Perkin Elmer	(1) AS-91, (1) AS-93, (1) S10	NA	1	NA	Mercury Lab
Mercury Auto Analyzer	Perkin Elmer	FIMS 100	IV	1	101S11061403	Mercury Lab
Microwave	CEM	MARS 5	NA	1	DS-8025	Metals Prep Lab
Microwave	CEM	MARS Xpress	NA	1	MD-2861	Metals Prep Lab
Microwave	CEM	MARS Xpress	NA	1	MD-9972	Metals Prep Lab
Microwave	CEM	MARS Xpress	NA	1	MD-9640	Metals Prep Lab
Microwave	CEM	MARS Xpress	NA	1	MD-4692	Metals Prep Lab
Prep Station	Env. Express	Automated prep station	Autoblock 3	1	AB1002-0708-001	Metals Prep Lab
Prep Station	Env. Express	Automated prep station	Autoblock 4	1	AB1001-1211-0035	Metals Prep Lab
TCLP Extraction Unit	Env. Express	6 Position	NA	1	NA	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	5	4803-12-542	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	5	1918-12-415	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	5	1918-12-414	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	5	5152-12-548	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	2	NA	TCLP Lab
TCLP Extraction Unit	Env. Express	10 Position	NA	1	NA	TCLP Lab
TCLP Extraction Unit	Env. Express	Teflon Vessels	NA	12	NA	TCLP Lab
TCLP Zero Headspace Extractor	Env. Express	Vessels	NA	22	NA	TCLP Lab
Turbidimeter	HACH	2100N		1	05090C020685	Metals Prep Lab
Water Purification - Nanopure	Barnstead	D11951		1	1372051120948	Metals Prep Lab
PH Meter	Orion	410A	NA	1	015683	TCLP Lab
Balance	Mettler Toledo			1	B246522879	TCLP Lab
Auto pipetters 1000µl to 20 µl	Oxford	Varies	NA		NA	Metals Lab
Auto pipetters	Eppendorf, Oxford	Varies	NA		NA	Metals Prep Lab
Drying Oven	VWR Scientific	1305U	NA	a	1000594	Metals Prep Lab
MAX/MIN Thermometer	Fischer Scientific	MAX/MIN	TCLP #1		122376671	TCLP Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

INSTRUMENT	P. M. DESCRIPTION	FREQUENCY
ICP	•Maintain manufacturer's service contract	Renew annually
ICP and ICPMS	•Pump tubing, torch alignment, o-ring, injector tip and torch	Check daily and adjust/change as needed
ICPMS	•Sampler and Skimmer cones	Clean or replace when needed
ICP and ICPMS	•Pump rollers	Clean and lubricate when needed
ICP and ICPMS	•Nebulizer	As needed
Mercury Analyzer	•Calibrate and check sensitivity with previous data	Daily with use
Mercury Analyzer	•Response factor problems, check tubing for leaks, particularly in pump head, and check cell for fogging	As needed
Mercury Analyzer	•Replace desiccant in tube	With each use
Mercury Analyzer	•Check rotometer for airflow, if inadequate, replace flex tubing in pump lead	As needed
TCLP Apparatus (ZHE)	•Change O-rings	As needed
Thermometer	•All working thermometers are compared to a NIST thermometer.	Semi-annually
pH Meter	•Calibrated according to manufacturers instructions. •The slope is documented and acceptable range 95-105%	Daily
Analytical Balance	•Analytical balances are checked and calibrated by a certified technician semi-annually. •Calibration is checked daily with class S weights. Must be within 0.1% S class weights calibrated annually	Semi-annually Daily
TCLP Tumblers	•Visually timed and confirmed to be 30±2 rpm.	Monthly
Microwaves	•Checked and calibrated by a certified technician	Semi-annually, calibrated weekly by staff
Microwaves	Check cap membranes for leaks	As needed

8.3 STANDARDS AND REAGENTS

All reagents and standards must meet the requirements listed in the analytical methods.

Table 8.3A: Stock Standard sources, receipt, and preparation information.
(subject to revision as needed)

STOCK STANDARD SOURCES
****ICP metals used – Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn (Sulfur is analyzed individually)***
****ICP/MS metals used – Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn***

Instrument Group/Standard	*Standard Source**	*How Received**	*Source/ Storage*	*Lab Stock Storage*	*Receipt Frequency*
	Env. Express	2ppm-Al, Mg, Fe 10ppm-Ca, K, Na	Room temp.	2% HNO3 w/ Tr HF	Annual/Expiration Date

Table 8.3A: Stock Standard sources, receipt, and preparation information.
(subject to revision as needed)

STOCK STANDARD SOURCES
ICP metals used – Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn (Sulfur is analyzed individually)
ICP/MS metals used – Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn

Instrument Group/Standard	*Standard Source**	*How Received**	*Source/ Storage*	*Lab Stock Storage*	*Receipt Frequency*
ICP/CCVLL ICP (single element standards)	 Env. Express or High Purity	4ppm- B, Si, 0.04ppm-Be 0.1ppm-Pb, Mo, Cd, Ba 0.2ppm-Cr, Co, Ag, Ti, Mn, Sr, V 0.4ppm-Tl, Sb, Ni, Sn, Cu, As, Se 0.6ppm-Zn 0.3ppm- Li 1000ppm	 Room temp.		 Annual/Expiration Date
ICP/ICV	High Purity	500ppm – Al. Ca, Fe, Mg, Na, K 5ppm – Ag 50ppm – All others	Room temp.	5% HNO3 w/ Tr HF	As needed
ICP/Calibration Standard and CCV	Env. Express	1000ppm – Al, Ca, Fe, K, Mg, Na 10ppm – Ag 20ppm- Sr 100ppm – All others	Room temp.	5% HNO3 w/ Tr HF	As needed
ICP/LCS water	Ultra Scientific	1000ppm – Ca, Mg, K, Na 100ppm – all others except Li (spiked separately)	Room temp.	5% HNO3	As needed
ICP/LCS soil	ERA	Varies with Lot #	Room temp.	none	As needed
ICP/ICSA	Env. Express	5000ppm – Al, Ca, Mg, Na 2000ppm – Fe 100ppm – K	Room temp.	10% HNO3	As needed
ICP/ICSB	Env. Express	100ppm – B, Cd, Pb, Ag, Ni, Si, Zn, 50ppm – all others except Sr, Li	Room temp.	4% HNO3 w/ Tr HF	As needed
ICP/Yttrium	Env. Express	10,000 ppm	Room temp.	4% HNO3	As needed
ICPMS/ICV	High Purity	5 ppm	Room temp.	5% HNO3 w/ Tr HF	As needed
ICPMS/ Calibration Standard and CCV	Env. Express	100 ppm- all others 1000ppm- Al, Mg, K, Ca, Fe, Na	Room temp.	5% HNO3 w/ Tr HF	As needed
ICPMS/LCS water	Ultra Scientific	1000ppm – Ca, Mg, K, Na 100ppm – all others except Li (spiked separately)	Room temp.	5% HNO3	As needed
ICPMS/LCS soil	ERA	Varies with Lot #	Room temp.	none	As needed
ICPMS/ICSA	Env. Express	10000ppm – Cl 2000ppm – C 1000ppm – Al, Ca, Fe, Mg, P, K, Na, S 20ppm – Mo, Ti	Room temp.	10% HNO3	As needed
ICPMS/ICSB	Env. Express	2ppm – Sb, As, Be, Cd, Cr, Co, Cu, Pb, Ni, Se, Ag, Tl, Sn, Zn	Room temp.	4% HNO3 w/ Tr HF	As needed

Table 8.3A: Stock Standard sources, receipt, and preparation information.
(subject to revision as needed)

STOCK STANDARD SOURCES
ICP metals used – Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn (Sulfur is analyzed individually)
ICP/MS metals used – Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn

Instrument Group/Standard	*Standard Source**	*How Received**	*Source/ Storage*	*Lab Stock Storage*	*Receipt Frequency*
Hg/ICV and LCS	Inorganic Ventures	1000ppm – Hg	Room temp.	2% HNO3	As needed
Hg/Calibration Standard and CCV	Env. Express	1000ppm – Hg	Room temp.	2% HNO3	As needed

**Equivalent Providers may be utilized.*

Table 8.3B: Working standard concentration, storage and preparation information.
(subject to revision as needed)

WORKING STANDARD PREPARATION
ICP metals used – Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn (Sulfur is analyzed individually)
ICP/MS metals used – Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn

Instrument Group/Standard	*How Prepared*	*Final Concentration*	*Source/ Storage*	*Expiration*
ICP/ICV	10mL Custom Stock ICV A and B, 0.1 mL stock Sc adjusted to 100mL with 5% HNO3	50ppm – Al, Ca, Fe, K, Mg, Na 0.5ppm – Ag 2ppm - Sr1ppm- Sc 5ppm – All others	Room temp.	1 month
ICP/Calibration Standard	Std 7- 0.5mL of Std. 6 Std 6 – 10mL Stock Cal. Std. Std 5 – 1mL Stock Cal. Std. Std 4 – 1mL Std. 6 Std 3 – 1mL Std. 5 Std 2 – 0.5mL Std. 5 Std 1 – 2mL Std. 4 All adjusted to 100 mL with 5%HNO3	Std 7- 0.5ppm Std 6 – 1/10/1000ppm Std 5 – 0.1/1/10ppm Std 4 – 0.01/0.1/1ppm Std 3 – 0.01/0.1ppm Std 2 – 0.005ppm Std 1 – 0.002ppm	Room temp.	1 month
ICP/CCV	50mL Custom Stock CCV and 1mL of Scandium stock adjusted to 1000mL with 5% HNO3	50ppm – Al, Ca, Fe, K, Mg, Na 0.5ppm – Ag 1ppm- Sc5ppm – All others	Room temp.	1 month
ICP/ICSA	100mL Custom Stock ICSA adjusted to 1000mL with 5% HNO3	500ppm – Al, Ca, Mg, Na 200ppm – Fe 10ppm – K	Room temp.	1 month
ICP/ICSAB	100mL Custom Stock ICSA, 10mL Stock ICSAB adjusted to 1000mL with 5% HNO3	500ppm – Al, Ca, Mg, Na 200ppm – Fe 10ppm – K 1ppm – B, Cd, Pb, Ag, Ni, Si, Zn, 0.5ppm – all others except Sr, Li	Room temp.	1 month
ICP/Yttrium	5mL Stock Yttrium adjusted to 10L with 5% HNO3	5 ppm	Room temp.	1 month
ICPMS/ICV	1.0mL Stock ICV, 0.50 of 10ppm Scandiumand 0.5mL of Fe stock adjusted to 100mL with 5% HNO3	5ppm-Fe0.05 ppm	Room temp.	1 month

Table 8.3B: Working standard concentration, storage and preparation information.
(subject to revision as needed)

WORKING STANDARD PREPARATION
****ICP metals used – Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn (Sulfur is analyzed individually)***
****ICP/MS metals used – Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn***

Instrument Group/Standard	*How Prepared*	*Final Concentration*	*Source/ Storage*	*Expiration*
ICPMS/ Calibration Standard	0.1 Stock Cal Std adjusted to 100mL with 5%HNO3. Serial Dilutions are done each calibration from 0.1ppm Std.	Cal 5 – 0.1ppm Cal 4 – 0.05ppm Cal 3 – 0.01ppm Cal 2 – 0.001ppm Cal 1 – 0.0005ppm	Room temp.	1 month
ICPMS/CCV	0.05mL Stock CCV and 0.225mL of Fe stock adjusted to 100mL with 5% HNO3.	0.050 ppm 5ppm-Fe	Room temp.	1 month
ICPMS/ICSA	10mL Stock ICSA adjusted to 100mL with 5% HNO3	1000ppm – Cl 200ppm – C 100ppm – Al, Ca, Fe, Mg, P, K, Na, S 2ppm – Mo, Ti	Room temp.	1 month
ICPMS/ICSAB	10mL Stock ICSA, 1mL Stock ICSAB adjusted to 100mL with 5% HNO3	1000ppm – Cl 200ppm – C 100ppm – Al, Ca, Fe, Mg, P, K, Na, S 2ppm – Mo, Ti 0.02ppm – Sb, As, Be, Ca, Cr, Co, Cu, Pb, Ni, Se, Ag, Tl, Sn, Zn	Room temp.	1 Month
Hg/ICV	30µL of 3ppm Intermediate	0.003ppm – Hg	Room temp.	1 Month
Hg/Calibration Standard	Soils: Std 6 - 100µL of 3ppm Intermediate Std 5 - 50µL of 3ppm Intermediate Std 4 - 200µL of 300ppb Intermediate Std 3 - 100µL of 300ppb Intermediate Std 2 - 40µL of 300ppb Intermediate Std 1 - 20µL of 300ppb Intermediate Waters: Std 6 - 50µL of 3ppm Intermediate Std 5 - 200µL of 300ppb Intermediate Std 4 - 100µL of 300ppb Intermediate Std 3 - 40µL of 300ppb Intermediate Std 2 - 20µL of 300ppb Intermediate Std 1 - 10µL of 300ppb Intermediate	Std 6 – 0.01ppm Std 5 – 0.005ppm Std 4 – 0.002ppm Std 3 – 0.001ppm Std 2 – 0.0004ppm Std 1 – 0.0002ppm Std 6 – 0.005ppm Std 5 – 0.002ppm Std 4 – 0.001ppm Std 3 – 0.0004ppm Std 2 – 0.0002ppm Std 1 – 0.0001ppm	Room temp.	4 days
Hg/CCV	2.5ppb CCV - 25µL of 3ppm Intermediate	0.0025ppm	Room temp.	1 Month
Hg/LCS	30µL of 3ppm Intermediate	0.003ppm – Hg	Room temp.	1 Month

8.4 INSTRUMENT CALIBRATION

Mercury Analyzer - SOP Numbers 340384A & 340384B

Calibration of the mercury analyzer is achieved using 5 standards. Acceptable calibration is achieved when the correlation coefficient ≥0.998. All results are calculated using software based on the peak area of the sample. A second source ICV is analyzed initially and must recover within ±10% for Methods 7470A/7471A/7471B and within ±5% for method 245.1. A primary source CCV is analyzed after every tenth sample and at the conclusion of the analytical sequence. The CCV must recovery within ±10% for all analyses. Duplicate and spike analyses are performed on 5% of the samples analyzed using EPA Method 7470A/7471A/7471B and on 10% of the samples analyzed using EPA Method 245.1.

Inductively Coupled Plasma - SOP Numbers 340386 & 340390

The PE ICP Optima 4300DV, 5300DV and PE ELAN 6100 and DRC-e ICPMS are calibrated using at least 3 standards. A new calibration curve is analyzed daily. All calculations are performed by software using computerized linear regression. The linear regression correlation coefficient for the each analyte in the calibration curve lines must be 0.998 or better for all methods, A second source ICV is run initially and a primary source CCV is run after every tenth sample. For method 200.7, the ICV must recover within 5% of the true value and for all other methods, the ICV must recover within 10%. The CCV for all methods must recover within 10% of the true value. Duplicate and spike analyses are performed on 5% of the samples for EPA Methods 6010B, 6010C, 6020, 6020A and on 10% of the samples analyzed using EPA Methods 200.7 & 200.8.

TABLE 8.4: CALIBRATION STANDARD CONCENTRATIONS
This table is subject to revision without notice

HIGH LEVEL	ICP (mg/L)	ICP/MS (mg/L)
Aluminum	0.10 - 100	----------
Antimony	0.01 - 10	0.0005 – 0.05
Arsenic	0.01 - 10	0.0005 – 0.10
Barium	0.005 - 10	0.0005 – 0.10
Beryllium	0.002 – 10	0.0005 – 0.01
Boron	0.10 – 10	----------
Cadmium	0.005 - 10	0.0005 – 0.10
Calcium	0.10 - 100	----------
Chromium	0.01 - 10	0.0005 – 0.10
Cobalt	0.01 - 10	0.0005 – 0.10
Copper	0.01 - 10	0.0005 – 0.10
Iron	0.10- 100	----------
Lead	0.005 - 10	0.0005 – 0.10
Lithium	0.005 - 10	----------

TABLE 8.4: CALIBRATION STANDARD CONCENTRATIONS *This table is subject to revision without notice*		
HIGH LEVEL	ICP (mg/L)	ICP/MS (mg/L)
Magnesium	0.10 - 100	----------
Manganese	0.010 - 10	0.0005 – 0.10
Molybdenum	0.002 - 10	0.0005 – 0.10
Nickel	0.01 - 10	0.0005 – 0.10
Potassium	0.50 - 100	----------
Selenium	0.01 - 10	0.0005 – 0.10
Silicon	0.10 - 10	----------
Silver	0.01 – 1.0	0.0005 – 0.05
Sodium	0.50 - 100	----------
Strontium	0.002 – 10	----------
Sulfur	10 - 100	----------
Thallium	0.01 - 10	0.0005 – 0.05
Tin	0.01 - 10	0.0005 – 0.10
Titanium	0.01 – 10	----------
Vanadium	0.01 - 10	0.0005 – 0.10
Zinc	0.010 - 10	0.001 – 0.10
MERCURY		
Mercury	Blank, 0.2 - 0.010 µg/L	

8.5 ACCEPTANCE/REJECTION OF CALIBRATION

The initial calibration curve is compared with previous curves for the same analyte. All new standard curves are immediately checked with a secondary source or laboratory control standard prepared from a separate source than those used for calibration. All curves are visually reviewed to ensure that acceptable correlation represents linearity. Calibration curves may be rejected for nonlinearity, abnormal sensitivity, or poor response of the laboratory control standard. Specific criteria for each instrument are outlined in Table 8.5.

Continuing calibration verification is performed on each day that initial calibration is not performed and following every tenth sample. If a check standard does not perform within established criteria then the instrument is evaluated to determine the problem. Once the problem is corrected, all samples between the last in control sample and the first out of control check are re-analyzed.

TABLE 8.5 INSTRUMENT CALIBRATION & QC

Instrument (Analysis)	Calibration Type	Number of Standards	Acceptance/ Rejection Criteria	Frequency
ICP & ICPMS	Linear/ Initial	3 - 5	6010C, 6020A, 6010B, 6020, 200.7 200.8: Must have a correlation coefficient of at least 0.998	Daily
ICP & ICPMS	Initial	Secondary source (ICV)	6010B, 6010C, 6020, 6020A, 200.8: ICV must be within +/-10%; 200.7: ICV must be within +/-5%	After initial calibration
ICP & ICPMS	Initial	1 Initial Calibration Blank	< ½ RL, concentrations of common laboratory contaminants shall not exceed the RL	After initial calibration
ICP, ICPMS, Mercury	Continuing	1 mid-level ref. std. (CCV)	Must be within ±10%	Every 10th sample
ICP & ICPMS	Continuing	1 Continuing Calibration Blank	< RL, concentrations of common laboratory contaminants must not exceed the RL	Every 10th sample
ICP & ICPMS	Continuing	1 ICSA 1 ICSAB	Must be within ±20% for ICP, No criteria for ICPMS	After initial calibration, at end and every 8 hours of run time.
ICP, ICPMS, Mercury	Continuing	1 Method Blank	< 1/2 RL, concentrations of common laboratory contaminants must not exceed the RL	1 per batch
ICP, ICPMS, Mercury	Continuing	1 Laboratory Control Standard	Liquid Samples (all methods) - LCS must be within ±15%. Solid Samples (all methods) - LCS must be within the certified standard value determined by the provider.	1 per batch
ICP, ICPMS, Mercury	Continuing	1 Sample Duplicate	Sample and Duplicate must have an RPD ≤20%	1 per batch
ICP & ICPMS	Continuing	1 Matrix Spike (MS), 1 Matrix Spike Duplicate (MSD)	Spike must be within ±25%, MS and MSD must have an RPD ≤20%	1 of each per batch
Mercury	Linear/ Initial	3 - 5	Must have a correlation coefficient of at least 0.998	Daily
Mercury	Initial	Secondary source (ICV)	7470A, 7471: ICV must be within ±10% 245.1: ICV must be within ±5%	After initial calibration
Mercury	Continuing	1 Continuing Calibration Blank	< RL	Every 10th sample
Mercury	Continuing	1 Matrix Spike (MS), 1 Matrix Spike Duplicate (MSD)	Spike must be within ±30%, MS and MSD must have an RPD ≤20%	1 of each per batch

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

ASTM Type I grade water.

9.2 GLASSWARE WASHING AND STERILIZATION PROCEDURES

Glassware involved in metals preparation is washed with soap and water, rinsed in 1+1 nitric acid, and rinsed in DI water. Through digestion blanks, it has been determined that chromic acid washing is unnecessary. Glassware with visible gummy deposits remaining after washing is disposed of properly. All metals glassware is given another DI water rinse immediately prior to use. Metals glassware is segregated from all other glassware.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the metals laboratory can be found in the following table.

TABLE 10.1: METALS DEPARTMENT SOPS

This table is subject to revision without notice

SOP #	Title
TCLP SOPs	
340358	TCLP
340704	SPLP
340363	EP TOX
340364	MEP
340705	California Waste Extraction Test
Mercury SOPs	
340384A	Mercury in Liquid Waste (Cold-Vapor Technique) 7470A/245.1
340384B	Mercury in Solid Waste (Cold-Vapor Technique) 7471A
Metals Prep SOPs	
340389	Acid Digestion of Aqueous Samples and Extracts Method 3005A/3010A/3015/3030C
340380	Digestion of Metals and Trace Elements in DW and Wastes Method 200.2
340388	Acid Digestion of Sediments, Sludge, Soils and Oils Method 3050B/3051
340701	Metals Digestion of personal cassettes Method 7300, 3051
340702	Metals Digestion for Sediments, Soils, and Sludge NIOSH 7300, Method 3051 for ELLAP Paint chips and ELLAP soils
340703	Metals Digestion of Hi-Vol filters and Environmental Lead Wipes 3050B and 3051
340391	Silver (Photographic Waste) Method 7760 and 272.1
340354A 340707	Turbidity-Metals Drinking Water Screen Only (EPA Method 180.1) FINE, COARSE SOIL SIEVE PREPARATORY PROCEDURE FOR LEAD ANALYSIS BASED ON MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY SOP 213, REV. 2

SOP #	Title
340392	Sodium Adsorption Ratio
Metals Analysis SOPs	
340386	Metals by ICP Method 6010, 200.7
340390	Metals by ICP-MS Method 6020, 200.8

11.0 QUALITY CONTROL CHECKS

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

11.1 ESC participates in proficiency testing (PTs) in support of various laboratory accreditations/recognitions. Environmental samples are purchased from Environmental Resource Associates (ERA). The WS, WP and solid matrix studies are completed every 6 months. For industrial hygiene and environmental lead accreditation, PTs are administered by AIHA. IHPAT samples for metals analysis, including lead in air, by NIOSH 7300 is completed every quarter. Soil, wipes and paint PTs are also completed in conjunction with the AIHA Environmental Lead Laboratory Accreditation Program (ELLAP). AIHA PT samples are received and analyzed by method according to the vendor's instructions and according to ESC SOP.

11.2 Initial Demonstrations of Capability (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing Demonstration of Capability (CDOCs) must be updated at least annually. The associated data is filed within the department and available for review.

11.3 Sample Duplicates, Matrix Spike and Matrix Spike Duplicates are performed on 5–10% of samples analyzed depending on analytical method requested. For methods 6010, 6020, 7470A and 7471A duplicates, matrix spikes and matrix spike duplicates are performed on 5% of samples. For methods 200.7, 200.8 and 245.1, the same QC is performed on 10% of samples. The RPD must not exceed 20%.

11.4 A laboratory control sample (LCS) is analyzed one per batch of samples. The acceptance criteria for all water samples is ±15%. See certificate of analysis for soil true values. For Industrial Hygiene samples, the LCS is analyzed in duplicate per batch.

11.5 A method preparation blank is performed per batch of samples processed. If one-half the reporting limit [RL] is exceeded, the laboratory evaluates whether reprocessing of the samples is necessary, based on the following criteria:

- The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparation batch or
- The blank contamination is greater than 1/10 of the specified regulatory limit.

The concentrations of common laboratory contaminants must not exceed the reporting limit. Any samples associated with a blank that fail these criteria is re-processed in a

subsequent preparation batch, except when the sample analysis resulted in non-detected results for the failing analytes.

12.0 DATA REDUCTION, VALIDATION, AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in ESC SOP #030201, *Data Handling and Reporting.* The Quality Control Department performs the secondary review of the data package using the ESC SOP #030227, *Data Review.* The QC Reviewer verifies that the analysis has performed as required and meets method criteria, all associate data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required flags on test reports, etc.)

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.1 for current QC targets and controls and current reporting limits.

12.3 REPORTING

Reporting procedures are documented in SOP #030201, *Data Handling and Reporting.*

Table 12.3A: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs
(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppb)
(ICP-AES)	Aluminum	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	5000
(ICP-AES)	Aluminum	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	5000
(ICP-AES)	Aluminum	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	100
(ICP-AES)	Aluminum	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	100
(ICP-MS)	Antimony	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-AES)	Antimony	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Antimony	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-MS)	Antimony	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1
(ICP-MS)	Antimony	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	1

Table 12.3A: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppb)
(ICP-AES)	Antimony	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Antimony	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	20
(ICP-MS)	Arsenic	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-AES)	Arsenic	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Arsenic	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Arsenic	1311, 1312	6010B/C	Leachate	85 - 115	<20	50
(ICP-MS)	Arsenic	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1
(ICP-MS)	Arsenic	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	1
(ICP-AES)	Arsenic	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Arsenic	NPDES	200.7	Liquid/Aqueous	85 - 115	<20	20
(ICP-MS)	Barium	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	100
(ICP-AES)	Barium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	250
(ICP-AES)	Barium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	250
(ICP-AES)	Barium	1311-12	6010B/C	Leachate	85 - 115	<20	150
(ICP-AES)	Barium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	5
(ICP-MS)	Barium	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	2
(ICP-MS)	Barium	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	2
(ICP-AES)	Barium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	5
(ICP-MS)	Beryllium	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-MS)	Beryllium	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1
(ICP-MS)	Beryllium	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	1
(ICP-AES)	Beryllium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	100
(ICP-AES)	Beryllium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	100
(ICP-AES)	Beryllium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	2
(ICP-AES)	Beryllium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	2
(ICP-AES)	Boron	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	10000
(ICP-AES)	Boron	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	10000
(ICP-AES)	Boron	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	200
(ICP-AES	Boron	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	200
(ICP-MS)	Cadmium	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	25
(ICP-AES)	Cadmium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	250

Table 12.3A: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppb)
(ICP-AES)	Cadmium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	250
(ICP-AES)	Cadmium	1311-1312	6010B/C	Leachate	85 - 115	<20	50
(ICP-MS)	Cadmium	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.5
(ICP-MS)	Cadmium	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	0.5
(ICP-AES)	Cadmium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	5
(ICP-AES)	Cadmium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	5
(ICP-AES)	Calcium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	25000
(ICP-AES)	Calcium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	25000
(ICP-AES)	Calcium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	500
(ICP-AES)	Calcium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	500
(ICP-MS)	Chromium	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-AES)	Chromium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-AES)	Chromium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-AES)	Chromium	1311-12	6010B/C	Leachate	85 - 115	<20	50
(ICP-MS)	Chromium	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1
(ICP-MS)	Chromium	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	1
(ICP-AES)	Chromium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	10
(ICP-AES)	Chromium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	10
(ICP-MS)	Cobalt	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-AES)	Cobalt	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-AES)	Cobalt	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-MS)	Cobalt	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1
(ICP-MS)	Cobalt	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	1
(ICP-AES)	Cobalt	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	10
(ICP-AES)	Cobalt	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	10
(ICP-MS)	Copper	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-AES)	Copper	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Copper	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Copper	1311-12	6010B/C	Leachate	85 - 115	<20	50
(ICP-MS)	Copper	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	1
(ICP-MS)	Copper	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1

Table 12.3A: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppb)
(ICP-AES)	Copper	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Copper	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Iron	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	5000
(ICP-AES)	Iron	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	5000
(ICP-AES)	Iron	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	100
(ICP-AES)	Iron	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	100
(ICP-MS)	Lead	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-AES)	Lead	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	250
(ICP-AES)	Lead	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	250
(ICP-AES)	Lead	1311-12	6010B/C	Leachate	85 - 115	<20	50
(ICP-MS)	Lead	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	1
(ICP-MS)	Lead	200.2 (mod.)	200.8	Liquid/Aqueous	85 - 115	<20	1
(ICP-AES)	Lead	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	5
(ICP-AES)	Lead	NPDES	200.7	Liquid/Aqueous	85 - 115	<20	5
(ICP-AES)	Lithium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	750
(ICP-AES)	Lithium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	750
(ICP-AES)	Lithium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	15
(ICP-AES)	Lithium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	15
(ICP-AES)	Magnesium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	5000
(ICP-AES)	Magnesium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	5000
(ICP-AES)	Magnesium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	100
(ICP-AES)	Magnesium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	100
(ICP-MS)	Manganese	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	100
(ICP-AES)	Manganese	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-AES)	Manganese	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-MS)	Manganese	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	2
(ICP-MS)	Manganese	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	2
(ICP-AES)	Manganese	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	10
(ICP-AES)	Manganese	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	10
(CVAA)	Mercury	7471 (mod.)	7471	Solid	Certified Standard Values	<20	20
(CVAA)	Mercury	1311-12	7470A	Leachate	85 - 115	<20	1

Table 12.3A: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppb)
(CVAA)	Mercury	245.1 (mod.)/7470A	245.1/7470A	Liquid/Aqueous	85 - 115	<20	0.2
(ICP-MS)	Molybdenum	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	100
(ICP-AES)	Molybdenum	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	250
(ICP-AES)	Molybdenum	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	250
(ICP-MS)	Molybdenum	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	2
(ICP-MS)	Molybdenum	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	2
(ICP-AES)	Molybdenum	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	5
(ICP-AES)	Molybdenum	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	5
(ICP-MS)	Nickel	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-AES)	Nickel	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Nickel	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Nickel	1311-12	6010B/C	Leachate	85 - 115	<20	50
(ICP-AES)	Nickel	3015/3010 (mod)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	1
(ICP-MS)	Nickel	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1
(ICP-AES)	Nickel	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Nickel	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Potassium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	25000
(ICP-AES)	Potassium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	25000
(ICP-AES)	Potassium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	500
(ICP-AES)	Potassium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	500
(ICP-MS)	Selenium	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-AES)	Selenium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Selenium	3051 (mod.),	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Selenium	1311-12	6010B/C	Leachate	85 - 115	<20	50
(ICP-MS)	Selenium	3015/3010 (mod.)	6020/A	Liquid/Aqueous	85 - 115	<20	1
(ICP-MS)	Selenium	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1
(ICP-AES)	Selenium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Selenium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Silicon	3050B (mod.)	6010B/C	Solid	85-115	<20	10000
(ICP-AES)	Silicon	3051 (mod.)	6010B/C	Solid	85-115	<20	10000
(ICP-AES)	Silicon	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	200

Table 12.3A: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppb)
(ICP-AES)	Silicon	200.2 (mod.) NPDES	200.7	Liquid/Aqueous	85 - 115	<20	200
(ICP-MS)	Silver	3050B (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	25
(ICP-AES)	Silver	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-AES)	Silver	1311-12	6010B/C	Leachate	85 - 115	<20	50
(ICP-MS)	Silver	3015/3010 (mod.)	6020/A	Liquid/Aqueous	85 - 115	<20	0.5
(ICP-MS)	Silver	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.5
(ICP-AES)	Silver	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	10
(ICP-AES)	Silver	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	10
(ICP-AES)	Sodium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	25000
(ICP-AES)	Sodium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	25000
(ICP-AES)	Sodium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	500
(ICP-AES)	Sodium	200.2 (mod.) NPDES	200.7	Liquid/Aqueous	85 - 115	<20	500
(ICP-AES)	Strontium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-AES)	Strontium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-AES)	Strontium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	10
(ICP-AES)	Strontium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	10
(ICP-AES)	Sulfur	3050B (mod.)	6010B/C	Solid	85-115	<20	50000
(ICP-AES)	Sulfur	3051 (mod.)	6010B/C	Solid	85-115	<20	50000
(ICP-AES)	Sulfur	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	1000
(ICP-AES)	Sulfur	200.2 (mod.) NPDES	200.7	Liquid/Aqueous	85 - 115	<20	1000
(ICP-MS)	Thallium	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-AES)	Thallium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Thallium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Thallium	3015/3010 (mod.)	6020/A	Liquid/Aqueous	85 - 115	<20	1
(ICP-MS)	Thallium	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1
(ICP-AES)	Thallium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Thallium	NPDES	200.7	Liquid/Aqueous	85 - 115	<20	20
(ICP-MS)	Tin	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	50
(ICP-AES)	Tin	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-AES)	Tin	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	1000
(ICP-MS)	Tin	3015/3010 (mod.)	6020/A	Liquid/Aqueous	85 - 115	<20	1

Table 12.3A: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppb)
(ICP-MS)	Tin	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1
(ICP-AES)	Tin	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Tin	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	20
(ICP-AES)	Titanium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-AES)	Titanium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-AES)	Titanium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	10
(ICP-AES)	Titanium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	10
(ICP-MS)	Vanadium	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	100
(ICP-AES)	Vanadium	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-AES)	Vanadium	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	500
(ICP-MS)	Vanadium	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	2
(ICP-MS)	Vanadium	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	2
(ICP-AES)	Vanadium	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	10
(ICP-AES)	Vanadium	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	10
(ICP-MS)	Zinc	3051 (mod.)	6020/A (mod.)	Solid	Certified Standard Values	<20	500
(ICP-AES)	Zinc	3050B (mod.)	6010B/C	Solid	Certified Standard Values	<20	1500
(ICP-AES)	Zinc	3051 (mod.)	6010B/C	Solid	Certified Standard Values	<20	1500
(ICP-AES)	Zinc	1311-12	6010B/C	Leachate	85 - 115	<20	50
(ICP-MS)	Zinc	3015/3010 (mod.)	6020/A (mod.)	Liquid/Aqueous	85 - 115	<20	10
(ICP-MS)	Zinc	200.2 (mod.), NPDES	200.8	Liquid/Aqueous	85 - 115	<20	10
(ICP-AES)	Zinc	3015/3010 (mod.)	6010B/C	Liquid/Aqueous	85 - 115	<20	30
(ICP-AES)	Zinc	200.2 (mod.), NPDES	200.7	Liquid/Aqueous	85 - 115	<20	30

Table 12.3B: QC Targets for IH Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (% RPD)	RL
(ICP-AES)	Lead	3050B (mod.)	6010B/C	Filters	85-115	<20	2.5 ug/sample
(ICP-AES)	Lead	3050B (mod.)	6010B/C	Paint Chips	80-120	<20	50. mg/kg
(ICP-AES)	Lead	3050B (mod.)	6010B/C	Wipes	80-120	<20	2.0 ug/sample

13.0 CORRECTIVE ACTIONS

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The reason for the nonconformance is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CAR is kept on file by the QA department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these control limits are exceeded, corrective action must be taken. Calculated sample spike control limits are also used.

All samples and procedures are governed by ESC's quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria takes precedence.

13.2.2 Calibration Verification Criteria Are Not Met: Inorganic Analysis

Rejection Criteria - See Table 8.5.

Corrective Action - If a standard curve linearity is not acceptable and/or the absorbance for specific standard(s) is not analogous to historic data, the instrument settings, nebulizer, etc. are examined to ensure that nothing has been altered, clogged, etc. The working standards are made fresh, intermediate dilutions are re-checked and the instrument is re-calibrated. If a problem persists, the Department Manager or QA department is notified for further action.

If the initial reference check sample is out of control, the instrument is re-calibrated and the check sample is rerun. If the problem continues the check sample is re-prepared. If the problem still exists then the standards and reagent blank are re-prepared. If the problem persists, the Department Manager or QA department is notified for further action.

13.2.3 Out Of Control Blanks: Applies to Method, Trip, Rinsate & Instrument Blanks

Rejection Criteria - Blank reading is more than ½ the RL for Method Blanks and/or Instrument Blanks.

Corrective Action - Standard curves and samples are evaluated for any obvious contamination that may be isolated or uniform throughout the sequence. If necessary, reagents, QC samples and field samples are re-prepared and re-analyzed. Re-analyses are not initiated until the cause of the contamination is identified and resolved. If samples have already been partially prepared or analyzed, the group leader or QA department is consulted to determine if data needs to be rejected or if samples need to be reprepped.

13.2.4 Out Of Control Laboratory Control Standards (LCS)

Rejection Criteria - If the performance is outside of lab-generated control (Listed in Table 12.3).

Corrective Action - Instrument settings are checked. The LCS standard is re-analyzed. If the LCS is still out of control, re-calibration is performed, and samples affected since the last in control reference standard are re-analyzed. If the LCS fails again after re-calibration, the entire workgroup must be re-prepped. The group leader, Department Manager, or QA department is consulted for further action.

13.2.5 Out Of Control Matrix Spike Samples

Rejection Criteria - If spike recovery is outside of lab-generated control limits determined from accuracy charts on matrix spike samples from a similar matrix (i.e., water, solid, etc).

Corrective Action - Spiking technique is assessed to ascertain if the sample has been spiked correctly. The spiked sample should be 1 – 5 times the client sample concentration; otherwise, the percent recovery (%R) or relative percent difference (%RPD) of the MS/MSD is flagged as not meaningful or usable per the EPA method. The sample is re-analyzed. If an out of control situation persists, sample matrix interference is suspected and flagged.

13.2.6 Out Of Control Duplicate Samples

Rejection Criteria - Lab-generated maximum RPD limit (as listed under precision in Table 12.3)

Corrective Action - Instrument and samples checked to see if precision variance is likely (i.e., high suspended solids content, high viscosity, etc.). The duplicates are re-analyzed along with the parent sample. If problem persists, matrix interference is suspected and flagged

13.2.7 Out Of Control Matrix Spike Duplicates

These QC samples can be out of control for either accuracy, precision, or both. The appropriate corrective actions listed for either matrix spikes, duplicate samples, or both are followed.

NOTE: Some samples cannot be duplicated. This is the case for wipe samples, filters, and some water samples. When possible, sampling personnel should collect duplicate samples.

Analysis-specific corrective action lists are available for each type of analysis performed by ESC.

13.2.8 Out Of Control Calibration Standards: ICV, CCV, SSCV

Rejection Criteria - If the performance is outside of method requirements.

Corrective Action - Instrument settings are checked, calibration verification standard is rerun. If the standard is still out of control, re-calibration is performed, and samples affected since the last in control reference standard are rerun. The group leader, Department Manager, or QA department is consulted for further action.

13.3 Responsibility - It is the Department Manager's responsibility to evaluate the validity of the corrective action response and submit it to QA department for processing. In addition, the manager is responsible for appointing the appropriate person within the department to be responsible for correcting the nonconformance. When a corrective action warrants a cessation of analysis, the following personnel are responsible for executing the "stop work" order:

- Laboratory Manager
- QA Department
- Department Manager
- Technical Service Representative

14.0 RECORD KEEPING

Record keeping is outlined in SOP #010103, *Document Control and Distribution*, SOP #030203, *Reagent Logs and Records* and SOP #030201, *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 8.0

1.0 SIGNATORY APPROVALS

VOLATILES QUALITY ASSURANCE MANUAL

APPENDIX VI TO THE ESC QUALITY ASSURANCE MANUAL

for

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Prepared by

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NOTE: The QAM has been approved by the following people. A signed cover page is available upon request

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure analytical data generated from the Volatiles (VOC) laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in non-conforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the client with both routine and specialized services, field sampling and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual Version 8.0.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Kenneth W. Buckley, with a B.S. degree in General Science, is the Laboratory Operations Manager. Mr. Buckley reviews and approves all data reduction associated with analyses in these areas and is responsible for the overall production of these laboratories; including the management of the staff and scheduling. Mr. Buckley has 12 years of environmental laboratory experience. In his absence,
Heidi Eng, with a B.S. degree in Chemistry and six years of environmental laboratory experience, assumes responsibility for Volatiles Department decisions.

5.2 TRAINING

5.2.1 All new analysts to the laboratory are trained by a primary analyst or Manager according to ESC protocol. Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in VOC analyses is demonstrated by acceptable participation in multiple proficiency testing programs (PTs) and daily Quality Control sample analyses. Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the instrumentation laboratory in Building #2 has approximately 7000 square feet with 700 square feet of bench area and 300 square feet of preparatory area. The lighting standard is fluorescence. The air handling systems are (1) 60-ton units with gas heating and (1) 25-ton unit. The physical and air-handling separations, between this laboratory and other ESC sections, prevent potential cross-contamination between solvent vapor generation and incompatible analytical processes. The laboratory reagent water is created by reverse osmosis/DI filtration and evaluated to 0.055uS/cm to ensure purity. Waste disposal containers are located in the laboratory and Clean Harbors serves as ESC's waste disposal carrier. Waste handling is discussed in detail in Section 6.0 of the ESC Quality Assurance Manual. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods.
- ESC's laboratory safety guidelines are detailed in the *ESC Chemical Hygiene and Safety Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Matrices for VOC environmental analyses include groundwater, wastewater, drinking water, soil, and sludge.
- Sample containers, preservation methods and holding times vary depending on analyses requested. Please see determinative procedures for specific directions.
- Plastic containers or lids may NOT be used for the storage of samples due to sample contamination from the phthalate esters and other hydrocarbons in the plastic.
- Environmental sample containers should be filled carefully to prevent any portion of the sample from coming into contact with the sampler's gloves causing possible contamination.
- Containers for VOC samples should be selected carefully to minimize headspace that could lead to a low bias in the analytical results. Headspace is monitored during sample login and is documented on the Sample Receipt Corrective Action form when observed.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Volatiles Analysis ***This table is subject to revision without notice***						
Item	***Manufacturer***	***Model***	***Instrument Name***	***#***	***Serial #***	***Location***
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	1	3333A31215	Volatiles
Gas Chromatograph	Agilent	6890	VOCGC	2	cn10609095	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	3	2950A26786	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	4	3336A50614	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	5	3027A29678	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	6	2950A27895	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	7	3313A37610	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	8	3033A31856	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	13	2921A23548	Volatiles
Gas Chromatograph	Agilent	6890	VOCGC	10	US00022519	Volatiles
Gas Chromatograph	Agilent	6890	VOCGC	12	US00000410	Volatiles
Gas Chromatograph	Agilent	6890	VOCGC	14	CN10408054	Volatiles
Gas Chromatograph/ Mass Spectrometer	Hewlett Packard	5890 GC/ 5972 MSD	VOCMS	1	GC336A50093 MS3329A00703	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5975 MSD	VOCMS	2	GCCN10641044 MSUS63234371	Volatiles
Gas Chromatograph/ Mass Spectrometer	Hewlett Packard	5890 GC/ 5972 MSD	VOCMS	3	GC3310A48625 MS3435A01982	Volatiles
Gas Chromatograph/ Mass Spectrometer	Hewlett Packard	5890 GC/ 5972 MSD	VOCMS	5	GC3310A48625 MS3341A01200	Volatiles
Gas Chromatograph/ Mass Spectrometer	Hewlett Packard	6890 GC/ 5973 MSD	VOCMS	6	CN10343037 US44647141	Volatiles
Gas Chromatograph/ Mass Spectrometer	Hewlett Packard	5890 GC/ 5972 MSD	VOCMS	9	GC3308A46997 MS3609A03629	Volatiles
Gas Chromatograph/ Mass Spectrometer	Hewlett Packard	5890 GC/ 5972 MSD	VOCMS	10	GC2921A22675 MS3329A00524	Volatiles
Gas Chromatograph/ Mass Spectrometer	Hewlett Packard	5890 GC/ 5972 MSD	VOCMS	12	GC3336A51994 MS3549A03312	Volatiles
Gas Chromatograph/ Mass Spectrometer	Hewlett Packard	5890 GC/ 5971 MSD	VOCMS	11	GC3336A61599 MS3306A04478	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	4	GCUS00003465 MSUS82311257	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	7	GCUS00040221 MS05040022	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	8	GCUS00040221 MS03940725	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	13	GCCN103390006 MSUS91911078	Volatiles

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	14	GCUS00009794 MSUS63810153	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	16	GCUS00006479 MSUS82321899	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	17	GCUS10232130 MSUS03940744	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	18	GC CN10517046 MSUS03340424	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	19	GCCN10611062 MSUS60542638	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5975MSD	VOCMS	20	GCCN621S4367 MSUS469A4832	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5975MSD	VOCMS	21	GCCN621S4368 MSUS469A4833	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	22	GCCN10728074 MSUS71236615	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5975MSD	VOCMS	23	GCCN10728068 MS71236616	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	24	GCCN10151020 MSUS10223406	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	25	GCCN99205324 MSUS98003634	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	26	GCCN10301152 MSUS10313616	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	27	GCCN10301155 MSUS10313619	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	28	GCUS000034135 MSUS94240103	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	29	GCUS00033898 MSUS94240096	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	30	GCUS10208101 MSUS10442360	Volatiles
Centurion Autosampler	(8) PTS/EST	Centurion				Volatiles
Autosampler	(27) Varian	Archon				Volatiles
Autosampler	(2) CDS	7400				Volatiles
Purge and Trap	CDS	7000E				Volatiles
Purge and Trap	(16) OI Analytical	Eclipse				Volatiles
Purge and Trap	(14) PTS/EST	Encon				Volatiles

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION		
INSTRUMENT	P. M. DESCRIPTION	FREQUENCY
Analytical Balances	•Check with Class "I" weights	Daily; tolerance ±0.1%
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semiannually
Refrigerators & Incubators	•Maintenance service	As needed - determined by daily temperature performance checks
Gas Chromatograph Detectors: FID	Change Quartz jet; clean; replace flame tip	As needed - when deterioration is noticeable
Gas Chromatograph Detectors: PID	Change or clean lamp	As needed - when deterioration is noticeable
Gas Chromatograph/Mass Spectrometer	•Autotune Report	Inspected daily
Gas Chromatograph/Mass Spectrometer	•Clean ion source	As needed to maintain high mass resolution
Gas Chromatograph/Mass Spectrometer & Gas Chromatographs	•Replace septum and liner	As needed to maintain injection port inert
Gas Chromatograph/Mass Spectrometer	•Replace vacuum pump oil	Every 6 months
Gas Chromatograph/Mass Spectrometer & Gas Chromatographs	•Replace column	When separation begins to degrade
Archon/ Centurion Autosampler	•Monitor the Daily QC, including internal standards for changes or failure.	Daily with use

8.3 STANDARDS AND REAGENTS

Table 8.3A: Standard stock sources, description and calibration information.
This table is subject to revision without notice

Method	Vendor*	Description	Calibration	Storage Req.	Expiration
8260	NSI	Gases Mix	Primary	-10°C to –20°C	1 week
	NSI	Custom VOC Mix1	Primary	-10°C to –20°C	6 months
	NSI	Mix 2	Primary	4° ± 2°C	6 months
	Absolute Stds	n-Hexane	Primary	-10°C to –20°C	6 months
	Restek	TX TPH Mix (GRO)	Primary	4° ± 2°C	6 months
	Ultra	CUS-5661	Primary	-10°C to –20°C	6 months
	NSI	Custom Std	Primary	4° ± 2°C	6 months
	Absolute Std	Acrolein	Primary	4° ± 2°C	3 months
	NSI	2-CEVE	Secondary	4° ± 2°C	6 months
	Restek	Vinyl Acetate	Secondary	-10°C to –20°C	6 months
	Restek	Custom LCS Additions	Secondary	-10°C to –20°C	6 months
	Restek	Custome Voa LCS Mix 1	Secondary	-10°C to –20°C	6 months
	Absolute Stds	n-Hexane	Secondary	-10°C to –20°C	6 months
	Restek	Acrolein	Secondary	4° ± 2°C	3 months
8015 (GRO)	Restek	Certified BTEX in Unleaded Gas Composite Standard	Primary	4° ± 2°C	6 months
	NSI	Gas Composite	Secondary	4° ± 2°C	6 months
8021	Restek	WISC PVOC/GRO Mix	Primary	-10°C to –20°C	6 months
	NSI	PVOC/GRO Mix	Secondary	4° ± 2°C	6 months
VPH	NSI	VPH ICV MIX	Primary	4° ± 2°C	6 months
	NSI	VPH LSC MIX	Secondary	4° ± 2°C	6 months

**Equivalent Providers may be utilized.*

TABLE 8.3B: Working Standard Concentrations *This table is subject to revision without notice*			
ORGANIC COMPOUNDS	**Method #**	**GC/MS**	**GC**
VOCs by GC/MS	524.2, 624, SM6200B 20th, 8260B	GW/WW 0.5, 1, 2, 5, 10, 25, 40, 50, 100 µg/L DW 0.5, 1, 2, 5, 10, 25, 50, 100, 150 µg/L GRO 0.4, 1, 2, 4, 5, 7, 10, 20ug/mL	
BTEX/GRO, 8015MOD, WI GRO, LA TPH G, OHIO GRO, WI PVOC	BTEX 8021 GRO 8015 or state specific		BTEX 0.5, 1, 5,10, 25,50,100,150,200, 250ug/L (m,p-Xylene is doubled) GRO 0.055, 0.11, 0.55, 1.1. 2.75, 5.5, 11 mg/L
MADEP VPH	MADEP VPH		Aromatic C9-C10: 0.001, 0.002, 0.01, 0.02, 0.05, 0.1, 0.2, 0.4, 1.0, 2.0 mg/L Aliphatic C5-C8: 0.006, 0.012, 0.06, 0.12, 0.3, 0.6, 1.2, 2.4, 6.0, 12.0 mg/L Aliphatic C9-C12: 0.007, 0.014, 0.07, 0.14, 0.36, 0.7, 1.4, 2.8, 7.0, 14.0 mg/L
BTEX/OA1	BTEX OA1		BTEX 0.5, 1, 5,10, 25,50,100,150,200, 250ug/L (m,p-Xylene is doubled) GRO 0.055, 0.11, 0.55, 1.1. 2.75, 5.5, 11 mg/L

8.4 INSTRUMENT CALIBRATION

602 - BTEX - SOP Number 330351

The gas chromatograph is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of three concentration levels for each compound of interest. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors are <10 % RSD over the working range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990 (0.995 for USACE DOD Projects). An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should recover within ±20% of the expected concentration for each analyte.

During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration

verification (CCV) standards. The CCV must recovery within 15% of the expected concentration for each analyte.

At daily instrument startup and in lieu of performing an entire initial calibration, the working calibration curve or response factors are verified on each working day by the analysis of a Quality Control Check Standard. The responses must meet the criteria found in Table 2 of the 602 Method. If the responses do not meet these criteria, the analysis must be repeated. If the standard still does not meet the criteria, a new calibration curve is prepared.

8021B - BTEX - SOP Number 330351

The gas chromatograph is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of five concentration levels for each compound of interest.

The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors are <20 % RSD over the working range, the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios (Area/Ref. Area) vs (Amt./Ref Amt). If the response factors of the initial calibration are <20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990 (0.995 for USACE DOD Projects). An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should recover within ±20% of the expected concentration for each analyte.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies from the predicted response by more than ±15%, the analysis must be repeated using fresh standard. If the standard still does not meet the acceptance criteria, a new initial calibration curve must be generated.

8015B/C/D & State Methods - Gasoline Range Organics - SOP Number 330351

Certain state accreditation/registration programs may have specific requirements for calibration and analysis that must be met. Those requirements supersede the general guidance provided in this section and are addressed in the determinative SOP. 8015GRO analysis, the gas chromatograph is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of five concentration levels for each analyte of interest. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the

instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are <20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990 (0.995 for USACE DOD Projects). An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should meet criteria of ±20% of the expected concentration for each analyte.

The working calibration curve or response factors are verified on each working day by the analysis of one or more calibration standards. If the response of any analyte varies from the predicted response by more than 15% RSD, the analysis must be repeated using a new calibration standard. If the standard still does not meet the criteria, a new calibration curve is prepared.

8260B/C, 624, SM6200B, 524.2 - Gas Chromatography/Mass Spectrometry (GC/MS): Volatile Organics - SOP Numbers 330363 & 330364

Detector mass calibration is performed daily using the autotune function of the GC/MS analytical system and PFTBA (perfluorotributylamine). Following verification of the appropriate masses, the instrument sensitivity is verified by injecting a tuning solution containing bromofluorobenzene (BFB). The BFB spectra must meet the following ion abundance criteria:

Mass	Ion Abundance Criteria
50	15 to 40% of mass 95
75	30 to 60% of mass 95
95	base peak, 100% relative abundance
96	5 to 9% of mass 95
173	0% to less than 2% of mass 174
174	greater than 50% of mass 95
175	5 to 9% of mass 174
176	greater than 95% but less than 101% of mass 174
177	5 to 9% of mass 176

Successful tuning must occur every 12 hours for method 524.2, 8260B/C & SM6200B and every 24 hours for method 624.

Following successful tuning, the GC/MS is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of three standards for method 624, 524.2 and five standards for method 8260B and SM6200B. The calibration standards are tabulated according to peak height or area against concentration and the concentrations and responses

of the internal standard analytes. The results are used to determine a response factor for each analyte in each standard injected. A calibration curve is constructed and is determined to be acceptable if each target analyte is found to be constant over the working range as defined as:

≤15% RSD for methods 8260B/C and SM6200B,
≤20% RSD for method 524.2, and
≤35% RSD for method 624.

The calibration checks compounds (CCCs) for method 8260 must be ≤30% RSD. When these conditions are met, linearity through the origin can be assumed and the average RF can be used in place of a calibration curve. Per the analytical method, specific target analytes are defined as calibration check compounds (CCCs) or system performance check compounds (SPCCs).

Linear regression can be used for any target compound exceeding the 15% RSD criteria but less than 40% (poor performers <50%), if the correlation coefficient is 0.990 or better. For USACE projects the correlation coefficient must meet 0.995 or better. The same is true for the CCCs as long as the RSD does not exceed 30%. A second source calibration verification standard is analyzed after each calibration and should meet the criteria of ± 20%. For 524.2 the second source calibration verification standard must be within ± 30%.

SPCCs:	
Analyte	**Minimum Average Response Factor**
Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

CCCs:	
1,1-Dicholoethene	Toluene
Chloroform	Ethylbenzene
1,2-Dichloropropane	Vinyl Chloride

The initial calibration range must represent the typical environmental sample and include the RL as the lowest calibration point. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range. A second source calibration verification standard is analyzed after each calibration. The second source should recover within 20% for all CCC compounds and within 40% for other analytes of interest, with the exception of analytes known to perform poorly (i.e. low purging efficiency, etc.) that will meet historical limits. Following successful calibration, the analysis of field and QC samples may begin. Analysis may be performed only during

the timeframe of a valid tuning cycle (12 hours for 8260B, 524.2 & SM6200B and 24 hours for 624). Following the expiration of the tuning clock, the instrument must be retuned and either recalibrated or existing calibration may be re-verified.

For 8260B, 524.2 & SM6200B analyses, daily calibration verification includes successful demonstration of BFB sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest, the CCC, and SPCC compounds. The BFB tune must meet the ion abundance criteria (see table above). Each SPCC in the calibration verification standard must meet the minimum response factors listed above. The CCC must achieve the criteria of +/- 20% RSD. Each internal standard in the CCV must recover between -50% to + 100%, when compared to the same internal standard compound in the mid-point standard of the initial calibration curve. Additionally, if the retention time of an internal standard changes by more than 30 seconds from the retention time of the same internal standard in the mid-level standard of the most recent initial calibration, the system must be evaluated, corrected, and possibly re-calibrated.

Daily calibration is accomplished for method 624 by a BFB tuning and analysis of a QC check standard. The BFB tune must meet EPA ion abundance criteria. The QC check standard must meet the criteria found in table 5 of the method.

Poor performing compounds for 8260B/524.2/SM6200B/624:

Dichlorofluoromethane	Vinyl acetate
Bromomethane	trans-1,4-Dichloro-2-butene
Chloroethane.	Alcohols (Ethanol, TBA, TAA, ETBA, TBF, Butanol)
2,2-Dichloropropane.	Iodomethane.
1,2-Dibromo-3-chloropropane	Naphthalene
2-Chloroethylvinylether (2-CEVE)	2- Methylnaphthalene
Acrolein	1- Methylnaphthalene
Acetone	4-Methyl-2-pentanone
2-Butanone	2-Hexanone

8.5 ACCEPTANCE/REJECTION OF CALIBRATION

Organic Chemistry

The initial calibration curve is compared with previous curves for the same analyte. All new standard curves are immediately checked with a secondary source or laboratory control standard prepared from a separate source than those used for calibration. All curves are visually reviewed to ensure that acceptable correlation represents linearity. Calibration curves may be rejected for nonlinearity, abnormal sensitivity, or poor response of the laboratory control standard.

Continuing calibration verification is performed on each day that initial calibration is not performed and following every tenth sample for GC analyses and once per 12 hour shift for GCMS analyses. If a check standard does not perform within established criteria, the instrument is evaluated to determine the cause. Once the issue is corrected, all samples between the last in control sample and the first out of control check is re-analyzed.

TABLE 8.5: INSTRUMENT CALIBRATION

Instrument (Analysis)	Calibration Type	Minimum Number of Standards	Type of Curve	Acceptance/ Rejection Criteria	Frequency
GC (VOC)	Initial	3 –600 series 5 –All others	Avg. RF	Must be ≤10% RSD for 601/602, ≤20%RSD for 8021B, and ≤20% difference for 8015B	As needed
			External	+/- 20% of true value	With each calibration
	Second Source	1 Second Source	Internal	Must be within 15% of the initial calibration curve	Beginning, every 10 and ending
	Daily / Cont.	1/10		Must be within 15% of the initial calibration curve	Every 12 hours
GC/MS VOC 8260	Initial	5 –8000 series	Avg. RF	8260B - Must be ≤15 %RSD for all target analytes and ≤30% for CCCs	As needed
	Second Source	1 Second Source		Should recover within 20% for all CCC compounds and within 40% for other analytes of interest, with the exception of analytes known to perform poorly	With each calibration
	Daily / Cont.	Tune & CCV every 12 hours		Must pass established method tuning criteria; 8260B - CCV must be ≤20% difference for CCC compounds, RF criteria for SPCC compounds must meet method criteria. Targets must meet ESC %drift criteria.	Every 12 hours
GC/MS VOC 624	Initial	3 –600 series	Avg. RF	624 - Must be ≤35 %RSD for all target analytes and ≤30% for CCCs	As needed
	Second Source	1 Second Source		Should recover within 20% for all CCC compounds and within 40% for other analytes of interest, with the exception of analytes known to perform poorly	With each calibration
	Daily / Cont.	Tune & CCV every 12 hours		Must pass established method tuning criteria; 624 - CCV must be ≤20% difference for CCC, RF for SPCC compounds must meet method criteria. Targets must meet ESC %drift criteria.	Every 12 hours

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

ASTM Type I grade water.

9.2 GLASSWARE WASHING PROCEDURE

All VOA sampling vials are purchased specifically for volatiles analysis and only used once. They are stored in a contaminant-free environment in the original carton with screw cap lids tightly fastened. All glassware used for volatiles analysis (volumetric flasks, syringes, etc.) is segregated from other laboratory glassware. Standard cleaning procedures involve rinsing three times with methanol. Volatiles spargers are kept on the autosampler at all times. Between runs, spargers are cleaned with a distilled water rinse. When a highly contaminated sample is purged, a blank is analyzed in the sparger before another sample can be purged in it. If the sparger is contaminated, it is removed from the autosampler and cleaned with soap and water then a methanol rinse followed by heating to drive off any remaining volatile contaminants. The sparger is then returned to its position and a blank analysis is performed. If the blank proves to be contaminant free, the system is then ready for further field sample analysis.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the volatiles laboratory can be found in the following table:

TABLE 10.1: VOLATILE DEPARTMENT SOPS

This table is subject to revision without notice

SOP #	Title
330351	BTEX and Gasoline Range Organics by Gas Chromatography (8015B)
330351A	TNGRO
330351B	BTEXM (8021B)
330354	NC - Volatile Petroleum Hydrocarbons
330357	Volatile Organic Compounds (GRO by GCMS)
330362	8021B (601/602) Volatile Organic Compounds by Gas Chromatography
330363	Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry
330364	DW Volatile Organic Compounds by GC/MS (524.2)
330365	VOC Screen using RAE Systems PID ppbRAE
330751	5035 Closed System Purge and Trap and Extraction for VOCs in Soil and Waste
330752	5030B Purge and Trap for Aqueous Samples

11.0 QUALITY CONTROL CHECKS

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

11.1 ESC participates in proficiency testing (PTs) in support of various laboratory accreditations/recognitions. Environmental samples are purchased from Environmental Resource Associates (ERA). The WS, WP and solid matrix studies are completed every 6 months. PT samples are received and analyzed by method according to the vendor's instructions and according to ESC SOP.

11.2 Initial Demonstrations of Capability (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing Demonstration of Capability (CDOCs) must be updated at least annually. The associated data is filed within the department and available for review.

11.3 Matrix Spike and Matrix Spike Duplicates are performed on each batch of samples analyzed depending on analytical method requested.

11.4 A Laboratory Control Sample (LCS) and LCS Duplicate (LCSD) are analyzed one per batch of samples.

11.5 A method preparation blank is performed per batch of samples processed. If one-half the reporting limit [RL] is exceeded, the laboratory shall evaluate whether reprocessing of the samples is necessary, based on the following criteria:

- The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparation batch or
- The blank contamination is greater than 1/10 of the specified regulatory limit. The concentrations of common laboratory contaminants shall not exceed the reporting limit. Any samples associated with a blank that fail these criteria shall be reprocessed in a subsequent preparation batch, except where the sample analysis resulted in non-detected results for the failing analytes.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in SOP #030201, *Data Handling and Reporting.* The Quality Control Department performs the secondary review of the data package using the ESC SOP #030227, *Data Review.* The QC Reviewer verifies that the analysis has performed as required and meets method criteria, all associate data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required flags on test reports, etc.)

TABLE 12.1 Data Reduction Formulas

PARAMETER	FORMULA
GC	response of sample analyte {*area*} x final extract volume {*mL*} x dilution response factor {*area/(mg/L)*} x initial extract volume-mass {*mL or g*} *Calculations performed by HP Enviroquant Software*
GC/MS	response of analyte {*area*} x extract volume {*mL*} x dilution x int. std amt. {*area*} response factor {*area/(mg/mL)*} x initial volume-mass {*mL or g*} x int. std cal. {area} *Calculations performed by HP Enviroquant Software*

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.3 by method for current QC targets and controls and current reporting limits.

Marginal Exceedance – When a large number of analytes exist in the LCS, it is statistically possible for a few analytes to be outside established control limits while the analytical system remains in control. These excursions must be random in nature and, if not, a review of the control limits or analytical process is necessary.

Upper and lower marginal exceedance (ME) limits are established as the mean of at least 20 data points ± four times their standard deviations. The number of allowable marginal exceedances per event is based on the number of analytes spiked in the LCS.

Allowable Marginal Exceedance per Event	
Analytes in LCS:	**ME Allowable**
>90	5
71-90	4
51-70	3
31-50	2
11-30	1
<11	0

Organic Control Limits - The organic QC targets are statutory in nature; warning and control limits for organic analyses are initially set for groups of compounds based on preliminary method validation data. When additional data becomes available, the QC targets are reviewed. All QC targets are routinely re-evaluated at least annually (and updated, if necessary) against laboratory historical data to insure that the limits continue to reflect realistic, method achievable goals.

12.3 REPORTING

Reporting procedures are documented in SOP #030201, *Data Handling and Reporting.*

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	Propene	8260B/C, 624, 6200B	GW, WW			0.0025	mg/L
Volatiles	1,3-Butadiene	8260B/C, 624, 6200B	GW, WW			0.001	mg/L
Volatiles	4-Ethyltoluene	8260B/C, 624, 6200B	GW, WW			0.001	mg/L
Volatiles	Dicyclopentadiene	8260B/C, 624, 6200B	GW, WW			0.001	mg/L
Volatiles	Dichlorodifluoromethane	8260B/C, 624, 6200B	GW, WW	39-189	24	0.001	mg/L
Volatiles	Chloromethane	8260B/C, 624, 6200B	GW, WW	45-152	20	0.001	mg/L
Volatiles	Vinyl Chloride	8260B/C, 624, 6200B	GW, WW	55-153	20	0.001	mg/L
Volatiles	Bromomethane	8260B/C, 624, 6200B	GW, WW	45-175	20	0.001	mg/L
Volatiles	Chloroethane	8260B/C, 624, 6200B	GW, WW	49-155	20	0.001	mg/L
Volatiles	Trichlorofluoromethane	8260B/C, 624, 6200B	GW, WW	54-156	20	0.001	mg/L
Volatiles	Ethyl Ether	8260B/C, 624, 6200B	GW, WW	60-142	20	0.001	mg/L
Volatiles	Acrolein	8260B/C, 624, 6200B	GW, WW	6-182	39	0.050	mg/L
Volatiles	1,1-Dichloroethene	8260B/C, 624, 6200B	GW, WW	60-130	20	0.001	mg/L
Volatiles	1,1,2-Trichloro-1,2,2-trifluoroethane	8260B/C, 624, 6200B	GW, WW	51-149	20	0.001	mg/L
Volatiles	Acetone	8260B/C, 624, 6200B	GW, WW	48-134	20	0.050	mg/L
Volatiles	Iodomethane	8260B/C, 624, 6200B	GW, WW	61-148	20	0.050	mg/L
Volatiles	Carbon Disulfide	8260B/C, 624, 6200B	GW, WW	41-148	20	0.001	mg/L
Volatiles	Methylene Chloride	8260B/C, 624, 6200B	GW, WW	64-125	20	0.005	mg/L

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	Acrylonitrile	8260B/C, 624, 6200B	GW, WW	60-140	20	0.050	mg/L
Volatiles	trans-1,2-Dichloroethene	8260B/C, 624, 6200B	GW, WW	67-129	20	0.001	mg/L
Volatiles	Methyl Tert Butyl Ether	8260B/C, 624, 6200B	GW, WW	51-142	20	0.001	mg/L
Volatiles	1,1-Dichloroethane	8260B/C, 624, 6200B	GW, WW	67-133	20	0.001	mg/L
Volatiles	Vinyl Acetate	8260B/C, 624, 6200B	GW, WW	34-178	26	0.050	mg/L
Volatiles	Di Isopropyl Ether	8260B/C, 624, 6200B	GW, WW	63-139	20	0.001	mg/L
Volatiles	2,2-Dichloropropane	8260B/C, 624, 6200B	GW, WW	46-151	20	0.001	mg/L
Volatiles	cis-1,2-Dichloroethene	8260B/C, 624, 6200B	GW, WW	72-128	20	0.001	mg/L
Volatiles	2-Butanone (MEK)	8260B/C, 624, 6200B	GW, WW	53-132	20	0.050	mg/L
Volatiles	Bromochloromethane	8260B/C, 624, 6200B	GW, WW	75-128	20	0.001	mg/L
Volatiles	Tetrahydrofuran	8260B/C, 624, 6200B	GW, WW	50-140	20	0.001	mg/L
Volatiles	Chloroform	8260B/C, 624, 6200B	GW, WW	66-126	20	0.005	mg/L
Volatiles	1,1,1-Trichloroethane	8260B/C, 624, 6200B	GW, WW	67-137	20	0.001	mg/kg
Volatiles	Carbon Tetrachloride	8260B/C, 624, 6200B	GW, WW	64-141	20	0.001	mg/kg
Volatiles	1,1-Dichloropropene	8260B/C, 624, 6200B	GW, WW	68-132	20	0.001	mg/kg
Volatiles	Benzene	8260B/C, 624, 6200B	GW, WW	67-126	20	0.001	mg/kg
Volatiles	1,2-Dichloroethane	8260B/C, 624, 6200B	GW, WW	67-133	20	0.001	mg/kg
Volatiles	Trichloroethene	8260B/C, 624, 6200B	GW, WW	74-126	20	0.001	mg/kg
Volatiles	1,2-Dichloropropane	8260B/C, 624, 6200B	GW, WW	74-122	20	0.001	mg/kg
Volatiles	Dibromomethane	8260B/C, 624, 6200B	GW, WW	73-125	20	0.001	mg/kg
Volatiles	Bromodichloromethane	8260B/C, 624, 6200B	GW, WW	68-133	20	0.001	mg/kg
Volatiles	2-Chloroethylvinyl Ether	8260B/C, 624, 6200B	GW, WW	0-171	27	0.050	mg/kg
Volatiles	cis-1,3-Dichloropropene	8260B/C, 624, 6200B	GW, WW	73-131	20	0.001	mg/kg
Volatiles	4-Methyl-2-Pentanone (MIBK)	8260B/C, 624, 6200B	GW, WW	60-142	20	0.050	mg/kg
Volatiles	Toluene	8260B/C, 624, 6200B	GW, WW	72-122	20	0.005	mg/kg
Volatiles	trans-1,3-Dichloropropene	8260B/C, 624, 6200B	GW, WW	66-137	20	0.001	mg/kg
Volatiles	1,1,2-Trichloroethane	8260B/C, 624, 6200B	GW, WW	79-123	20	0.001	mg/kg
Volatiles	Tetrachloroethene	8260B/C, 624, 6200B	GW, WW	67-135	20	0.001	mg/kg
Volatiles	1,3-Dichloropropane	8260B/C, 624, 6200B	GW, WW	77-119	20	0.001	mg/kg
Volatiles	2-Hexanone	8260B/C, 624, 6200B	GW, WW	56-147	20	0.050	mg/kg
Volatiles	Chlorodibromomethane	8260B/C, 624, 6200B	GW, WW	73-138	20	0.001	mg/kg
Volatiles	1,2-Dibromoethane	8260B/C, 624, 6200B	GW, WW	75-126	20	0.001	mg/kg
Volatiles	Chlorobenzene	8260B/C, 624, 6200B	GW, WW	77-125	20	0.001	mg/kg
Volatiles	1,1,1,2-Tetrachloroethane	8260B/C, 624, 6200B	GW, WW	75-134	20	0.001	mg/kg
Volatiles	Ethylbenzene	8260B/C, 624, 6200B	GW, WW	76-129	20	0.001	mg/kg
Volatiles	Total-Xylene	8260B/C, 624, 6200B	GW, WW	75-128	20	0.003	mg/kg

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	Styrene	8260B/C, 624, 6200B	GW, WW	78-130	20	0.001	mg/kg
Volatiles	Bromoform	8260B/C, 624, 6200B	GW, WW	60-139	20	0.001	mg/L
Volatiles	Isopropylbenzene	8260B/C, 624, 6200B	GW, WW	73-132	20	0.001	mg/L
Volatiles	Bromobenzene	8260B/C, 624, 6200B	GW, WW	76-123	20	0.001	mg/L
Volatiles	1,1,2,2-Tetrachloroethane	8260B/C, 624, 6200B	GW, WW	72-128	20	0.001	mg/L
Volatiles	1,2,3-Trichloropropane	8260B/C, 624, 6200B	GW, WW	68-130	20	0.001	mg/L
Volatiles	trans-1,4-Dichloro-2-Butene	8260B/C, 624, 6200B	GW, WW	48-139	20	0.001	mg/L
Volatiles	n-Propylbenzene	8260B/C, 624, 6200B	GW, WW	71-132	20	0.001	mg/L
Volatiles	2-Chlorotoluene	8260B/C, 624, 6200B	GW, WW	74-128	20	0.001	mg/L
Volatiles	4-Chlorotoluene	8260B/C, 624, 6200B	GW, WW	74-130	20	0.001	mg/L
Volatiles	1,3,5-Trimethylbenzene	8260B/C, 624, 6200B	GW, WW	73-134	20	0.001	mg/L
Volatiles	tert-Butylbenzene	8260B/C, 624, 6200B	GW, WW	72-134	20	0.001	mg/L
Volatiles	1,2,4-Trimethylbenzene	8260B/C, 624, 6200B	GW, WW	72-135	20	0.001	mg/L
Volatiles	sec-Butylbenzene	8260B/C, 624, 6200B	GW, WW	70-135	20	0.001	mg/L
Volatiles	1,3-Dichlorobenzene	8260B/C, 624, 6200B	GW, WW	70-121	20	0.001	mg/L
Volatiles	p-Isopropyltoluene	8260B/C, 624, 6200B	GW, WW	68-138	20	0.001	mg/L
Volatiles	1,4-Dichlorobenzene	8260B/C, 624, 6200B	GW, WW	70-121	20	0.001	mg/L
Volatiles	1,2,3-Trimethylbenzene	8260B/C, 624, 6200B	GW, WW	70-127	20	0.001	mg/L
Volatiles	1,2-Dichlorobenzene	8260B/C, 624, 6200B	GW, WW	75-122	20	0.001	mg/L
Volatiles	n-Butylbenzene	8260B/C, 624, 6200B	GW, WW	63-142	20	0.001	mg/L
Volatiles	1,2-Dibromo-3-Chloropropane	8260B/C, 624, 6200B	GW, WW	55-134	20	0.001	mg/L
Volatiles	1,2,4-Trichlorobenzene	8260B/C, 624, 6200B	GW, WW	65-137	20	0.001	mg/L
Volatiles	Hexachlorobutadiene	8260B/C, 624, 6200B	GW, WW	67-135	20	0.001	mg/L
Volatiles	Naphthalene	8260B/C, 624, 6200B	GW, WW	56-145	20	0.005	mg/L
Volatiles	1,2,3-Trichlorobenzene	8260B/C, 624, 6200B	GW, WW	63-138	20	0.001	mg/L
Volatiles	Hexane	8260B/C, 624, 6200B	GW, WW	33-167	20	0.010	mg/L
Volatiles	Acetonitrile	8260B/C, 624, 6200B	GW, WW	61.3-134-.7	25	0.050	mg/L
Volatiles	Allyl Chloride	8260B/C, 624, 6200B	GW, WW	77.9-127-.7	25	0.005	mg/L
Volatiles	Chloroprene	8260B/C, 624, 6200B	GW, WW	49.4-142.3	25	0.050	mg/L
Volatiles	Isobutanol	8260B/C, 624, 6200B	GW, WW	59.3-137.6	25	0.100	mg/L
Volatiles	1,4-Dioxane	8260B/C, 624, 6200B	GW, WW	76.2-132.3	25	0.100	mg/L
Volatiles	Methacrylonitrile	8260B/C, 624, 6200B	GW, WW	74.7-126.1	25	0.050	mg/L
Volatiles	Methyl Methacrylate	8260B/C, 624, 6200B	GW, WW	62-142.2	25	0.005	mg/L
Volatiles	Ethyl methacrylate	8260B/C, 624, 6200B	GW, WW	55.4-126.3	25	0.005	mg/L
Volatiles	2-Propanol	8260B/C, 624, 6200B	GW,WW	70-130	25	.05	mg/L

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	Propionitrile	8260B/C, 624, 6200B	GW, WW	53.7-143.7	25	0.050	mg/L
Volatiles	Pentachloroethane	8260B/C, 624, 6200B	GW, WW	10-200	25	0.005	mg/L
Volatiles	Cyclohexanone	8260B/C, 624, 6200B	GW, WW	36.5-138.1	25	0.010	mg/L
Volatiles	Bromoethane	8260B/C, 624, 6200B	GW, WW	74.3-136.2	25	0.001	mg/L
Volatiles	2Butanol	8260B/C, 624, 6200B	GW, WW	64.8-140.6	25	0.050	mg/L
Volatiles	Ethanol	8260B/C, 624, 6200B	GW, WW	51.8-153.6	25	0.050	mg/L
Volatiles	Di-isopropyl ether	8260B/C, 624, 6200B	GW, WW	63-139	20	0.001	mg/L
Volatiles	Ethyl tert-butyl ether	8260B/C, 624, 6200B	GW, WW	63.5-131.4	25	0.001	mg/L
Volatiles	Methyl-tert-butyl ether	8260B/C, 624, 6200B	GW, WW	51-142	20	0.001	mg/L
Volatiles	Tert-Butyl alcohol	8260B/C, 624, 6200B	GW, WW	44.2-173.9	25	0.050	mg/L
Volatiles	Tert-Amyl Methyl Ether	8260B/C, 624, 6200B	GW, WW	69.3-125.1	25	0.001	mg/L
Volatiles	Propene	8260B/C, 624, 6200B	solid			0.0025	Mg/l
Volatiles	1,3-Butadiene	8260B/C, 624, 6200B	solid			0.001	Mg/L
Volatiles	4-Ethyltoluene	8260B/C, 624, 6200B	solid			0.001	Mg/L
Volatiles	Dicyclopentadiene	8260B/C, 624, 6200B	solid			0.001	Mg/L
Volatiles	Dichlorodifluoromethane	8260B/C	Solid	26-186	22	0.001	mg/kg
Volatiles	Chloromethane	8260B/C	Solid	42-149	20	0.001	mg/kg
Volatiles	Vinyl Chloride	8260B/C	Solid	50-151	20	0.001	mg/kg
Volatiles	Bromomethane	8260B/C	Solid	41-175	20	0.001	mg/kg
Volatiles	Chloroethane	8260B/C	Solid	44-159	20	0.001	mg/kg
Volatiles	Trichlorofluoromethane	8260B/C	Solid	52-147	20	0.001	mg/kg
Volatiles	Ethyl Ether	8260B/C	Solid	56-147	20	0.001	mg/kg
Volatiles	Acrolein	8260B/C	Solid	3-181	31	0.050	mg/kg
Volatiles	1,1-Dichloroethene	8260B/C	Solid	53-136	20	0.001	mg/kg
Volatiles	1,1,2-Trichloro-1,2,2-trifluoroethane	8260B/C	Solid	49-155	20	0.001	mg/kg
Volatiles	Acetone	8260B/C	Solid	44-140	25	0.050	mg/kg
Volatiles	Iodomethane	8260B/C	Solid	55-156	20	0.050	mg/kg
Volatiles	Carbon Disulfide	8260B/C	Solid	36-161	20	0.001	mg/kg
Volatiles	Methylene Chloride	8260B/C	Solid	57-129	20	0.005	mg/kg
Volatiles	Acrylonitrile	8260B/C	Solid	55-143	20	0.050	mg/kg
Volatiles	trans-1,2-Dichloroethene	8260B/C	Solid	61-133	20	0.001	mg/kg
Volatiles	Methyl Tert Butyl Ether	8260B/C	Solid	44-148	20	0.001	mg/kg
Volatiles	1,1-Dichloroethane	8260B/C	Solid	61-134	20	0.001	mg/kg
Volatiles	Vinyl Acetate	8260B/C	Solid	45-163	20	0.050	mg/kg
Volatiles	Di Isopropyl Ether	8260B/C	Solid	59-143	20	0.001	mg/kg
Volatiles	2,2-Dichloropropane	8260B/C	Solid	50-147	20	0.001	mg/kg

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	cis-1,2-Dichloroethene	8260B/C	Solid	71-129	20	0.001	mg/kg
Volatiles	2-Butanone (MEK)	8260B/C	Solid	51-131	25	0.050	mg/kg
Volatiles	Bromochloromethane	8260B/C	Solid	73-130	20	0.001	mg/kg
Volatiles	Tetrahydrofuran	8260B/C	Solid	44-144	25	0.001	mg/kg
Volatiles	Chloroform	8260B/C	Solid	63-123	20	0.005	mg/kg
Volatiles	1,1,1-Trichloroethane	8260B/C	Solid	62-135	20	0.001	mg/kg
Volatiles	Carbon Tetrachloride	8260B/C	Solid	60-140	20	0.001	mg/kg
Volatiles	1,1-Dichloropropene	8260B/C	Solid	63-132	20	0.001	mg/kg
Volatiles	Benzene	8260B/C	Solid	65-128	20	0.001	mg/kg
Volatiles	1,2-Dichloroethane	8260B/C	Solid	58-141	20	0.001	mg/kg
Volatiles	Trichloroethene	8260B/C	Solid	71-126	20	0.001	mg/kg
Volatiles	1,2-Dichloropropane	8260B/C	Solid	71-128	20	0.001	mg/kg
Volatiles	Dibromomethane	8260B/C	Solid	70-130	20	0.001	mg/kg
Volatiles	Bromodichloromethane	8260B/C	Solid	66-126	20	0.001	mg/kg
Volatiles	2-Chloroethylvinyl Ether	8260B/C	Solid	0-188	39	0.050	mg/kg
Volatiles	cis-1,3-Dichloropropene	8260B/C	Solid	73-132	20	0.001	mg/kg
Volatiles	4-Methyl-2-Pentanone (MIBK)	8260B/C	Solid	61-143	23	0.050	mg/kg
Volatiles	Toluene	8260B/C	Solid	70-120	20	0.005	mg/kg
Volatiles	trans-1,3-Dichloropropene	8260B/C	Solid	70-135	20	0.001	mg/kg
Volatiles	1,1,2-Trichloroethane	8260B/C	Solid	77-124	20	0.001	mg/kg
Volatiles	Tetrachloroethene	8260B/C	Solid	65-135	20	0.001	mg/kg
Volatiles	1,3-Dichloropropane	8260B/C	Solid	76-120	20	0.001	mg/kg
Volatiles	2-Hexanone	8260B/C	Solid	62-145	23	0.050	mg/kg
Volatiles	Chlorodibromomethane	8260B/C	Solid	72-137	20	0.001	mg/kg
Volatiles	1,2-Dibromoethane	8260B/C	Solid	76-127	20	0.001	mg/kg
Volatiles	Chlorobenzene	8260B/C	Solid	75-125	20	0.001	mg/kg
Volatiles	1,1,1,2-Tetrachloroethane	8260B/C	Solid	73-134	20	0.001	mg/kg
Volatiles	Ethylbenzene	8260B/C	Solid	74-128	20	0.001	mg/kg
Volatiles	Total-Xylene	8260B/C	Solid	74-127	20	0.003	mg/kg
Volatiles	Styrene	8260B/C	Solid	76-133	20	0.001	mg/kg
Volatiles	Bromoform	8260B/C	Solid	64-139	20	0.001	mg/kg
Volatiles	Isopropylbenzene	8260B/C	Solid	73-130	20	0.001	mg/kg
Volatiles	Bromobenzene	8260B/C	Solid	75-123	20	0.001	mg/kg
Volatiles	1,1,2,2-Tetrachloroethane	8260B/C	Solid	74-129	20	0.001	mg/kg
Volatiles	1,2,3-Trichloropropane	8260B/C	Solid	70-133	20	0.001	mg/kg
Volatiles	trans-1,4-Dichloro-2-Butene	8260B/C	Solid	52-143	20	0.001	mg/kg

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	n-Propylbenzene	8260B/C	Solid	71-132	20	0.001	mg/kg
Volatiles	2-Chlorotoluene	8260B/C	Solid	73-128	20	0.001	mg/kg
Volatiles	4-Chlorotoluene	8260B/C	Solid	72-129	20	0.001	mg/kg
Volatiles	1,3,5-Trimethylbenzene	8260B/C	Solid	71-133	20	0.001	mg/kg
Volatiles	tert-Butylbenzene	8260B/C	Solid	72-132	20	0.001	mg/kg
Volatiles	1,2,4-Trimethylbenzene	8260B/C	Solid	68-135	20	0.001	mg/kg
Volatiles	sec-Butylbenzene	8260B/C	Solid	71-134	20	0.001	mg/kg
Volatiles	1,3-Dichlorobenzene	8260B/C	Solid	71-132	20	0.001	mg/kg
Volatiles	p-Isopropyltoluene	8260B/C	Solid	67-138	20	0.001	mg/kg
Volatiles	1,4-Dichlorobenzene	8260B/C	Solid	72-123	20	0.001	mg/kg
Volatiles	1,2,3-Trimethylbenzene	8260B/C	Solid	73-126	20	0.001	mg/kg
Volatiles	1,2-Dichlorobenzene	8260B/C	Solid	77-123	20	0.001	mg/kg
Volatiles	n-Butylbenzene	8260B/C	Solid	60-145	20	0.001	mg/kg
Volatiles	1,2-Dibromo-3-Chloropropane	8260B/C	Solid	61-134	21	0.001	mg/kg
Volatiles	1,2,4-Trichlorobenzene	8260B/C	Solid	61-148	20	0.001	mg/kg
Volatiles	Hexachlorobutadiene	8260B/C	Solid	65-137	20	0.001	mg/kg
Volatiles	Naphthalene	8260B/C	Solid	61-142	20	0.005	mg/kg
Volatiles	1,2,3-Trichlorobenzene	8260B/C	Solid	62-146	20	0.001	mg/kg
Volatiles	Hexane	8260B/C	Solid	28-169	20	0.010	mg/kg
Volatiles	Acetonitrile	8260B/C	Solid	59.6-170.4	25	0.050	mg/kg
Volatiles	Allyl Chloride	8260B/C	Solid	66.7-106.4	25	0.005	mg/kg
Volatiles	Chloroprene	8260B/C	Solid	61-114.3	25	0.050	mg/kg
Volatiles	Isobutanol	8260B/C	Solid	80.4-130.2	25	0.100	mg/kg
Volatiles	1,4-Dioxane	8260B/C	Solid	78.4-148.5	25	0.100	mg/kg
Volatiles	Methacrylonitrile	8260B/C	Solid	87.1-108.6	25	0.050	mg/kg
Volatiles	Methyl Methacrylate	8260B/C	Solid	90.4-141.9	25	0.005	mg/kg
Volatiles	Ethyl methacrylate	8260B/C	Solid	41.6-159	25	0.005	mg/kg
Volatiles	Propionitrile	8260B/C	Solid	77.8-136	25	0.050	mg/kg
Volatiles	Pentachloroethane	8260B/C	Solid	63.5-179.2	25	0.005	mg/kg
Volatiles	Cyclohexanone	8260B/C	Solid	21.3-170	25	0.010	mg/kg
Volatiles	Bromoethane	8260B/C	Solid	61.7-123.8	25	0.001	mg/kg
Volatiles	2Butanol	8260B/C	Solid	82.5-138.5	25	0.050	mg/kg
Volatiles	Ethanol	8260B/C	Solid	65.6-136.3	25	0.050	mg/kg
Volatiles	Di-isopropyl ether	8260B/C	Solid	59-143	20	0.001	mg/kg
Volatiles	Ethyl tert-butyl ether	8260B/C	Solid	81.4-110.9	25	0.001	mg/kg

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	Methyl-tert-butyl ether	8260B/C	Solid	44-148	20	0.001	mg/kg
Volatiles	Tert-Butyl alcohol	8260B/C	Solid	59.5-170.4	25	0.050	mg/kg
Volatiles	Tert-Amyl Methyl Ether	8260B/C	Solid	82-115.5	25	0.001	mg/kg
Volatiles	2-Propanol	8260B/C	Solid	70-130	25	0.05	mg/kg
Volatiles	GRO	8015B/C/D	GW, WW	70-124	20	0.100	mg/L
Volatiles	Benzene	8021B, 602, 6200C	GW, WW	79 - 131	20	0.0005	mg/L
Volatiles	Toluene	8021B, 602, 6200C	GW, WW	68 - 114	20	0.005	mg/L
Volatiles	Ethylbenzene	8021B, 602, 6200C	GW, WW	68 - 125	20	0.0005	mg/L
Volatiles	m&p-Xylene	8021B, 602, 6200C	GW, WW	67 - 113	20	0.001	mg/L
Volatiles	o-Xylene	8021B, 602, 6200C	GW, WW	72 - 114	20	0.0005	mg/L
Volatiles	MTBE	8021B, 602, 6200C	GW, WW	60 - 133	20	0.001	mg/L
Volatiles	Benzene	502.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Toluene	502.2	DW	70 - 130	25	0.005	mg/L
Volatiles	Ethylbenzene	502.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	m&p-Xylene	502.2	DW	70 - 130	25	0.001	mg/L
Volatiles	o-Xylene	502.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	MTBE	502.2	DW	70 - 130	25	0.001	mg/L
Volatiles	GRO	8015B	Solid	67 - 135	20	0.500	mg/kg
Volatiles	Benzene	8021B	Solid	78 - 141	20	0.0025	mg/kg
Volatiles	Toluene	8021B	Solid	65 - 117	20	0.025	mg/kg
Volatiles	Ethylbenzene	8021B	Solid	69 - 133	20	0.0025	mg/kg
Volatiles	m&p-Xylene	8021B	Solid	61 - 121	20	0.005	mg/kg
Volatiles	o-Xylene	8021B	Solid	71 - 121	20	0.0025	mg/kg
Volatiles	MTBE	8021B	Solid	54 - 129	20	0.005	mg/kg
Volatiles	1,1,1,2-Tetrachloroethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,1,1-Trichloroethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,1,2,2-Tetrachloroethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,1,2-Trichloroethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,1-Dichloroethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,1-Dichloroethene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,1-Dichloropropanone	524.2	DW	70 - 130	25		mg/L
Volatiles	1,1-Dichloropropene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,2,3-Trichlorobenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,2,3-Trichloropropane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,2,4-Trichlorobenzene	524.2	DW	70 - 130	25	0.0005	mg/L

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	1,2,4-Trimethylbenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,2-Dibromo-3-chloropropane	524.2	DW	70 - 130	25	0.0010	mg/L
Volatiles	1,2-Dibromoethane	524.2	DW	70 - 130	25	0.0010	mg/L
Volatiles	1,2-Dichlorobenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,2-Dichloroethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,2-Dichloropropane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,3,5-Trimethylbenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,3-Dichlorobenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,3-Dichloropropane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1,4-Dichlorobenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	1-Chlorobutane	524.2	DW	70 - 130	25		mg/L
Volatiles	2,2-Dichloropropane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	2-Butanone	524.2	DW	70 - 130	25		mg/L
Volatiles	2-Chlorotoluene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	2-Hexanone	524.2	DW	70 - 130	25		mg/L
Volatiles	2-Nitropropane	524.2	DW	70 - 130	25		mg/L
Volatiles	4-Chlorotoluene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	4-Isopropyltoluene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	4-Methyl-2-pentanone	524.2	DW	70 - 130	25		mg/L
Volatiles	Acetone	524.2	DW	70 - 130	25	0.01	mg/L
Volatiles	Acrylonitrile	524.2	DW	70 - 130	25		mg/L
Volatiles	Allyl Chloride	524.2	DW	70 - 130	25		mg/L
Volatiles	Benzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Bromobenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Bromochloromethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Bromodichloromethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Bromoform	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Bromomethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Carbon Disulfide	524.2	DW	70 - 130	25		mg/L
Volatiles	Carbon Tetrachloride	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Chloroacetonitrile	524.2	DW	70 - 130	25		mg/L
Volatiles	THMs	524.2	DW	70 - 130	25		mg/L
Volatiles	Chlorobenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Chloroethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Chloroform	524.2	DW	70 - 130	25	0.0005	mg/L

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
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Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	Chloromethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Cis-1,2-dichloroethene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Cis-1,3-dichloropropene	524.2	DW	70 - 130	25	0.0010	mg/L
Volatiles	Dibromochloromethane	524.2	DW	70 - 130	25		mg/L
Volatiles	Dibromomethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Dichlorodifluoromethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Diethyl ether	524.2	DW	70 - 130	25		mg/L
Volatiles	Ethyl Methacrylate	524.2	DW	70 - 130	25		mg/L
Volatiles	Ethylbenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Hexachlorobutadiene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Hexachloroethane	524.2	DW	70 - 130	25		mg/L
Volatiles	Isopropylbenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Meta-xylene	524.2	DW	70 - 130	25		mg/L
Volatiles	Methacrylonitrile	524.2	DW	70 - 130	25		mg/L
Volatiles	Methyl Iodide	524.2	DW	70 - 130	25		mg/L
Volatiles	Methylacrylate	524.2	DW	70 - 130	25		mg/L
Volatiles	Methylene Chloride	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Methylmethacrylate	524.2	DW	70 - 130	25		mg/L
Volatiles	Methyl-t-butyl ether	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Naphthalene	524.2	DW	70 - 130	25	0.0050	mg/L
Volatiles	N-butylbenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Nitrobenzene	524.2	DW	70 - 130	25		mg/L
Volatiles	N-propylbenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Ortho-xylene	524.2	DW	70 - 130	25		mg/L
Volatiles	Para-xylene	524.2	DW	70 - 130	25		mg/L
Volatiles	Pentachloroethane	524.2	DW	70 - 130	25		mg/L
Volatiles	Propionitrile	524.2	DW	70 - 130	25		mg/L
Volatiles	Sec-butylbenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Styrene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Tert-butylbenzene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Tetrachloroethene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Tetrahydrofuran	524.2	DW	70 - 130	25		mg/L
Volatiles	Toluene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Trans-1,2-dichloroethene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Trans-1,3-dichloropropene	524.2	DW	70 - 130	25	0.0010	mg/L

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	Trans-1,4-dichloro-2-butene	524.2	DW	70 - 130	25		mg/L
Volatiles	Trichloroethene	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Trichlorofluoromethane	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Vinyl Chloride	524.2	DW	70 - 130	25	0.0005	mg/L
Volatiles	Xylenes – total	524.2	DW	70 - 130	25		mg/L

*** Specific organizations may require limits that supersede values listed.*

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CAR are kept on file by the QA Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these limits are exceeded, corrective action must be taken. Calculated sample spike control limits are also used.

All samples and procedures are governed by ESC's quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP.

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria take precedence.

13.2.2 Out Of Control Blanks: Applies to Method, Trip, Rinsate & Instrument Blanks

Rejection Criteria - Blank reading is more than twice the background absorbance or more than 1/2 RL.

Corrective Action - Blanks are reanalyzed and the response is assessed. Standard curves and samples are evaluated for any obvious contamination that is isolated or uniform throughout the run. If necessary, reagents are re-prepared. Analyses are not initiated until

the problem is identified and solved. If samples have already been prepared or analyzed, the Department Manager or QA Department is consulted to determine if data needs to be rejected or if samples need to be re-prepared.

13.2.3 Out Of Control Laboratory Control Standards (LCS & LCSD)

Rejection Criteria - If the performance is outside of lab-generated control limits which are calculated as the mean of at least 20 data points +/- 3 times the standard deviation of those points (Listed in Section 12) and the marginal exceedance allowance is surpassed (see section 12.2).

Corrective Action - Instrument settings are checked and the LCS standard is re-analyzed. If the LCS is still out of control, instrumentation is checked for systemic problems and repaired (if necessary). Re-calibration is performed and the samples affected since the last in control reference standard are rerun. The group leader, Department Manager, or QA Department is consulted for further action.

13.2.4 Out Of Control Matrix Spike Samples

Rejection Criteria - If sample is outside of lab-generated control limits from accuracy charts on matrix spike samples from a similar matrix (i.e., water, solid, etc). Limits are calculated as the mean of at least 20 data points +/- 3 times the standard deviation of those points.

Corrective Action - Spiking technique is assessed to ascertain if the sample has been spiked correctly. The spiked sample should be 1 – 5 times the client sample concentration; otherwise, the percent recovery (%R) or relative percent difference (%RPD) of the MS/MSD is flagged as not meaningful or usable. The sample is re-spiked and re-analyzed, along with several other similar samples in subset. If an out of control situation persists, sample matrix interference is indicated. Samples to be analyzed by standard additions are prepared (where appropriate), and the group leader, Department Manager, or QA Department is notified.

13.2.5 Out Of Control Duplicate Samples

Rejection Criteria - Lab-generated maximum RPD limit (as listed under precision in Section 12)

Corrective Action - Instrument and samples are checked to see if precision variance is likely (i.e., high suspended solids content, high viscosity, etc.). They are re-analyzed in duplicate and samples just before and just after the duplicated sample are re-checked. If problem still exists, Department Manager, or QA Department is notified to review the analytical techniques.

13.2.6 Out Of Control Matrix Spike Duplicates

Rejection Criteria - These QC samples can be out of control for accuracy, precision, or both.

Corrective Action - The appropriate corrective actions listed for either matrix spikes, duplicate samples, or both are followed.

NOTE: Some samples cannot be duplicated. This is the case for wipe samples, filters, and some water samples. When possible, sampling personnel should collect duplicate samples.

13.2.7 Out Of Control Calibration Standards: ICV, CCV, SSCV

Rejection Criteria - If the performance is outside of method requirements.

Corrective Action - Instrument settings are checked, calibration verification standard is re-analyzed. If the standard is still out of control, re-calibration is performed, and samples affected since the last in control reference standard are rerun. The group leader, Department Manager, or QA Department is consulted for further action.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #010103, *Document Control and Distribution*, SOP #030203, *Reagent Logs and Records* and SOP #030201, *Data Handling and Reporting*. Volatile organics calibration data are recorded and integrated using HP Enviroquant software. Calibration data from the volatile analyses, in addition to the initial and daily calibration, includes GC/MS autotunes, DFTPP reports and surrogate recovery reports. Hard copy records of initial calibration and daily calibration are stored with chromatograms and integrated with sample data by date analyzed.

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 8.0.

1.0 SIGNATORY APPROVALS

Semi-Volatile
QUALITY ASSURANCE MANUAL

APPENDIX VII TO THE ESC
QUALITY ASSURANCE MANUAL

for

ESC LAB SCIENCES
12065 LEBANON ROAD
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Prepared by

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NOTE: The QAM has been approved by the following people. A signed cover page is available upon request

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that analytical data generated from the Semi-Volatile (SVOC) laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in non-conforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the client with both routine and specialized services, field sampling and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual Version 8.0.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Kenneth W. Buckley, with a B.S. degree in General Science, is the Laboratory Operations Manager. Mr. Buckley reviews and approves all data reduction associated with analyses in these areas and is responsible for the overall production of these laboratories; including the management of the staff and scheduling. Mr. Buckley has over 13 years of environmental laboratory experience. In his absence, Chris Johnson assumes responsibility for departmental decisions. Mr. Johnson has a B.S. degree in Biology and over 12 years of environmental laboratory experience.

5.2 TRAINING

5.2.1 All new analysts to the laboratory are trained by the primary analyst or Manager according to ESC protocol. Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in SVOC analyses and preparation is also demonstrated by acceptable participation in multiple proficiency testing programs (PTs) and daily Quality Control sample analyses. Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the instrumentation laboratory in Building #1 has nearly 4500 square feet with approximately 220 square feet of bench area and an additional storage area of 210 square feet. The air handling system in this area is a 100-ton Trane split unit with natural gas for heating. The 4000 square feet of area in the extraction laboratory, contained in Building 5, includes roughly 330 square feet of bench area with 245 square feet of hood space. There is an additional 2000 square feet of storage for this laboratory. The air system is a 15-ton make-up unit plus 15-ton HVAC with electric heat. The physical and air-handling separations, between this laboratory and other ESC sections, prevent potential cross-contamination between solvent vapor generation and incompatible analytical processes. The laboratory reagent water is provided through the US Filter deionizer system. Waste disposal containers are located in the laboratory and Clean Harbors serves as ESC's waste disposal carrier as discussed in detail in Section 6.0 of the ESC Quality Assurance Manual. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods.
- ESC's laboratory safety guidelines are detailed in the *ESC Chemical Hygiene and Safety Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Matrices for SVOC environmental analyses include groundwater, wastewater, drinking water, soil, and sludge. Matrices for Industrial Hygiene analyses include: sorbent tubes, filters, or Organic Vapor Monitor (OVM) Badges.
- Sample containers, preservation methods and holding times vary depending on analyses requested. Please see determinative procedures for specific directions.
- Plastic containers or lids may NOT be used for the storage of samples due to possible contamination from the phthalate esters and other hydrocarbons.
- Environmental sample containers should be filled carefully to prevent any portion of the sample from coming into contact with the sampler's gloves causing possible phthalate contamination.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Semi-Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph 2	HP	6890	svcompa	2	US00004397	SVOC
Gas Chromatograph 7	Agilent	6890	svcompe	7	US10350064	SVOC
Gas Chromatograph 8	Agilent	6890	svcompp	8	DE00022534	SVOC
Gas Chromatograph 9	HP	6890	svcompj	9	US00029095	SVOC
Gas Chromatograph 10	Agilent	6890	svcompk	10	US00039655	SVOC
Gas Chromatograph 11	Agilent	6890	svcompn	11	US00040550	SVOC
Gas Chromatograph 12	Agilent	6890	svcompo	12	US00034155	SVOC
Gas Chromatograph 13	HP	6890	svcomps	13	US00010364	SVOC
Gas Chromatograph 14	HP	6890	svcompt	14	US00020581	SVOC
Gas Chromatograph 16	Agilent	6890	svcompv	16	US10212071	SVOC
Gas Chromatograph 17	Agilent	6890	svcompw	17	US10344078	SVOC
Gas Chromatograph 18	Agilent	6890	svcompd	18	US10351038	SVOC
Gas Chromatograph 19	Agilent	6890	svcompaa	19	CN10516070	SVOC
Gas Chromatograph 20	Agilent	6890	svcompab	20	CN10543031	SVOC
Gas Chromatograph 21	Agilent	7890	svcompae	21	CN 10730070	SVOC
Gas Chromatograph 22	Agilent	7890	svcompaf	22	CN 10730081	SVOC
Gas Chromatograph 23	Agilent	6890	svcompag	23	CN 92174366	SVOC
Gas Chromatograph 24	Agilent	6890	svcompah	24	CN 92174369	SVOC
Gas Chromatograph 25	Agilent	7890	svcompaj	25	CN 10091009	SVOC
Gas Chromatograph 26	Agilent	7890	Svcompar	26	CN11501138	SVOC
Gas Chromatograph 27	Agilent	7890	Svcompas	27	CN11501139	SVOC
Gas Chromatograph 28	Agilent	7890	Svcompat	28	US11521018	SVOC
Gas Chromatograph 29	Agilent	7890	Svcompau	29	CN11521077	SVOC
Gas Chromatograph 30	Agilent	7890	svcompav	30	US11521020	SVOC
Gas Chromatograph Detectors 3	Detectors	NPD/NPD	svcompo	3	N/A	SVOC
Gas Chromatograph Detectors 7	Detectors	FID	svcompe	7	N/A	SVOC
Gas Chromatograph Detectors 8	Detectors	FID	svcompp	8	N/A	SVOC
Gas Chromatograph Detectors 9	Detectors	FID	svcompj	9	N/A	SVOC
Gas Chromatograph Detectors 10	Detectors	ECD/ECD	svcompk	10	F) U11751 B) U11135	SVOC

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Semi-Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph Detectors 11	Detectors	ECD/ECD	svcompn	11	F) U12482 B) U12481	SVOC
Gas Chromatograph Detectors 12	Detectors	FPD/FPD	svcompo	12	N/A	SVOC
Gas Chromatograph Detectors 13	Detectors	FID	svcomps	13	N/A	SVOC
Gas Chromatograph Detectors 14	Detectors	ECD/ECD	svcompt	14	F) U0418 B) U6632	SVOC
Gas Chromatograph Detectors 16	Detectors	FID	svcompu	16	N/A	SVOC
Gas Chromatograph Detectors 17	Detectors	FID	svcompv	17	N/A	SVOC
Gas Chromatograph Detectors 18	Detectors	ECD/ECD	svcompd	18	F) U8422 B) U11613	SVOC
Gas Chromatograph Detectors 19	Detectors	ECD/ECD	svcompaa	19	F) U2620 B) U11614	SVOC
Gas Chromatograph Detectors 20	Detectors	ECD/ECD	svcompab	20	F) U8422 B) U8423	SVOC
Gas Chromatograph Detectors 21	Detectors	FID	svcompae	21	N/A	SVOC
Gas Chromatograph Detectors 22	Detectors	ECD/ECD	svcompaf	22	N/A	SVOC
Gas Chromatograph Detectors 23	Detectors	ECD/ECD	svcompag	23	F) U11733 B) U11734	SVOC
Gas Chromatograph Detectors 24	Detectors	ECD/ECD	svcompah	24	F) U13989 B) U13988	SVOC
Gas Chromatograph Detectors 26	Detectors	FID	svcompar	26	N/A	SVOC
Gas Chromatograph Detectors 27	Detectors	FID	svcompas	27	N/A	SVOC
Gas Chromatograph Detectors 28	Detectors	ECD/ECD	Svcompat	28	F) U20406 B) U20407	SVOC
Gas Chromatograph Detectors 29	Detectors	ECD/ECD	Svcompat	29	F) U20277 B) U20299	SVOC
Gas Chromatograph Detectors 30	Detectors	ECD/ECD	svcompat	30	F) U20425 B) U20424	SVOC
Gas Chromatograph/Mass Spectrometer 1	Agilent	6890 GC/5973MSD	svcompf	1	GC CN10335001 MS US33220022	SVOC
Gas Chromatograph/Mass Spectrometer 2	Agilent	6890 GC/5973MSD	svcompc	2	GC US10409048 MS US35120400	SVOC
Gas Chromatograph/Mass Spectrometer 3	Agilent	6890 GC/5973MSD	svcompz	3	GC US00039611 MS US03940681	SVOC
Gas Chromatograph/Mass Spectrometer 4	Agilent	6890 GC/5973MSD	svcomph	4	GC CN10403067 MS US35120308	SVOC
Gas Chromatograph/Mass Spectrometer 5	Agilent	6890 GC/5973MSD	svcompi	5	GC US00024766 MS US91911297	SVOC
Gas Chromatograph/Mass Spectrometer 6	Agilent	6890 GC/5973MSD	svcompl	6	GC US00039647 MS US05040021	SVOC
Gas Chromatograph/Mass Spectrometer 7	Agilent	6890 GC/5973MSD	svcompm	7	GC ---------- MS US03940745	SVOC
Gas Chromatograph/Mass Spectrometer 9	Agilent	6890 GC/5973MSD	svcompx	9	GC CN10344042 MS US33220158	SVOC

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Semi-Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph/Mass Spectrometer 10	Agilent	6890 GC/5973MSD	svcompy	10	GC CN10340045 MS US33220183	SVOC
Gas Chromatograph/Mass Spectrometer 11	Agilent	6890 GC/5975MSD		11	GC CN10509031 MS US60532657	SVOC
Gas Chromatograph/Mass Spectrometer 12	Agilent	7890 GC/5975MSD	svcompai	12	GC CN10728074/ MS 12-0706-1325	SVOC
Gas Chromatograph/Mass Spectrometer 13	Agilent	7890 GC/5975MSD	svcompak	13	GC CN10301081/ MS US10313621	SVOC
Gas Chromatograph/Mass Spectrometer 14	Agilent	7890 GC/5975MSD	Svcompal	14	GC: CN11031022 MS: US11093726	SVOC
Gas Chromatograph/Mass Spectrometer 15	Agilent	7890 GC/5975MSD	Svcompam	15	GC: CN10301081 MS: US10313621	SVOC
Gas Chromatograph/Mass Spectrometer 16	Agilent	7890 GC/5975MSD	Svcompan	16	GC: CN10301152 MS: US10313616	SVOC
Gas Chromatograph/Mass Spectrometer 17	Agilent	7890 GC/5975MSD	Svcompao	17	GC: CN11191064 MS: US11363807	SVOC
Gas Chromatograph/Mass Spectrometer 18	Agilent	7890 GC/5975MSD	Svcompap	18	GC: CN11401093 MS: US11403903	SVOC
Gas Chromatograph/Mass Spectrometer 19	Agilent	7890 GC/5975MSD	Svcompaq	19	GC: CN11391051 MS: US11383838	SVOC
Gas Chromatograph/Mass Spectrometer 20	Agilent	7890 GC/5975MSD	Svcompaw	20	GC: CN12031161 MS: US11503941	SVOC
Gas Chromatograph/Mass Spectrometer 21	Agilent	7890 GC/5975MSD	Svcompax	21	GC: CN12031160 MS: US11513903	SVOC
Gas Chromatograph/Mass Spectrometer 22	Agilent	7890 GC/5975MSD	Svcompay	22	GC: CN11521157 MS: US12023909	SVOC
Gas Chromatograph/Mass Spectrometer 23	Agilent	7890 GC/5975MSD	Svcompaz	23	GC: CN12031114 MS: US11433926	SVOC
High Performance Liquid Chromatography	Agilent	1100 Series DAD/FLD	hplc1	1	DAD de01608402 FLD de23094489	SVOC
High Performance Liquid Chromatography	Agilent	1100 Series DAD/FLD	hplc2	2	DAD de30518420 FLD de11103457	SVOC
High Performance Liquid Chromatography (HPLC3)	Agilent	1100 Series DAD	hplc3	3	DAD us64400711	SVOC
High Performance Liquid Chromatography (HPLC4)	Agilent	1100 Series DAD/FLD	hplc4	4	DAD de43623013 FLD de92001880	SVOC
Analytical Balance	Mettler Toledo	PB1502-S		1	1126193668	Ext. Lab
Analytical Balance	Mettler Toledo	MS1602S		2	B243464732	Ext.Lab
Analytical Balance	Mettler Toledo	MS1602S		3	B243464732	Ext.Lab
Analytical Balance	Ohaus	ARA520		3	1202120618	Ext. Lab
Analytical Balance	Ohaus	ARA520		4	1202120814	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	1	2302	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	2	2304	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	3	2303	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	4	0400000940	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	5	406583020005	Ext. Lab

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Semi-Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Automatic Concentrators	Buchi	Syncore	Buchi	6	1469	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	7	1461	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	8	417004020002	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	9	416870050003	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	10	1466	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	11	1463	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	12	1462	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	13	1468	Ext. Lab
Capping station	Horizon	MARS X			snxc2225	Ext. Lab
Capping station	Horizon	MARS X			snxc2215	Ext. Lab
Centrifuge	Labnet	Z-400		1	2158	Ext. Lab
Centrifuge	Sorvall	ST-40		2	2224	Ext. Lab
Centrifuge	Sorvall	ST-40		3	2225	Ext. Lab
Centrifuge	Sorvall	ST-40		4	2226	Ext. Lab
Centrifuge	Sorvall	ST-40		5	2227	Ext. Lab
Concentration Chiller	Lauda	WKL 3200			2031	Ext. Lab
Concentration Chiller	Lauda	WKL 3200			2039	Ext. Lab
Furnace	Thermo Scientific				1882	Ext. Lab
Oven	Fisher	6556			166	Ext. Lab
LVI Shaker	Eberbach				2159	Ext. Lab
RV shaker	Eberbach	F6010.00			041242	Ext. Lab
RV shaker	Eberbach	F6010.00			041250	Ext. Lab
RV shaker	Basham				2326	Ext. Lab
HAA Shaker	Eberbach	6010-04			1834	Ext. Lab
HAA water Bath	Thermo Scientific	280 series			2033602-102	Ext. Lab
High Intensity Ultrasonic Processor	Misonix			1	2193	Ext. Lab
High Intensity Ultrasonic Processor	Misonix			2	1382	Ext. Lab
High Intensity Ultrasonic Processor	Misonix			3	1888	Ext. Lab
High Intensity Ultrasonic Processor	Misonix			4	1381	Ext. Lab
High Intensity Ultrasonic Processor	Misonix			5	1640	Ext. Lab
Microwave	CEM	MARS X		1	1507	Ext. Lab
Microwave	CEM	MARS X		2	1518	Ext. Lab
Microwave	CEM	MARS X		3	2269	Ext. Lab
OG concentrator	Horizon	SpeedVap III		1	1534	Ext. Lab
OG concentrator	Horizon	SpeedVap III		2	SN04-2020	Ext. Lab
OG concentrator	Horizon	SpeedVap III		3	2186	Ext. Lab
OG SPE extractor	Horizon	SPE-DEX 3000		1	1481	Ext. Lab

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Semi-Volatiles Analysis ***This table is subject to revision without notice***						
Item	***Manufacturer***	***Model***	***Instrument Name***	***#***	***Serial #***	***Location***
OG SPE extractor	Horizon	SPE-DEX 3000		2	1482	Ext. Lab
OG SPE extractor	Horizon	SPE-DEX 3000		3	1483	Ext. Lab
OG SPE extractor	Horizon	SPE-DEX 3000		4	1484	Ext. Lab
OG SPE Controllers	Horizon	1000/3000XL		1	2125	Ext. Lab
OG SPE Controllers	Horizon	1000/3000XL		2	2126	Ext. Lab
OG SPE Controllers	Horizon	1000/3000XL		3	2127	Ext. Lab
OG SPE Controllers	Horizon	1000/3000XL		4	2128	Ext. Lab
Separatory funnel rotators	ATR				1510	Ext. Lab
Separatory funnel rotators	ATR				1511	Ext. Lab
Separatory funnel rotators	ATR				1512	Ext. Lab
Separatory funnel rotators	ATR				1513	Ext. Lab
Separatory funnel rotators	ATR				1514	Ext. Lab
Separatory funnel rotators	ATR				1515	Ext. Lab
Separatory funnel rotators	ATR				1516	Ext. Lab
Separatory funnel rotators	ATR				2055	Ext. Lab
Separatory funnel rotators	ATR				2056	Ext. Lab
Separatory funnel rotators	ATR				2057	Ext. Lab
Water Bath Sonicator	Branson	8510			RPA040384175E	Ext. Lab
Vacuum Pump	Gast			1	0908605640	Ext. Lab
Vacuum Pump	Gast			2	0611012209	Ext. Lab
Vacuum Pump	Gast			3	0311000841	Ext. Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

INSTRUMENT	**P. M. DESCRIPTION**	**FREQUENCY**
Analytical Balances	•Check with Class "I" weights	Daily-tolerance $\pm$0.1%
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semiannually
Refrigerators & Incubators	•Maintenance service	As needed - determined by daily temperature performance checks
Gas Chromatograph Detectors: ECD	•Bake off or Replace •Perform wipe leakage test	As needed - when deterioration is noticeable Annually
Gas Chromatograph Detectors: FID	•Change Quartz jet; clean; replace flame tip	As needed - when deterioration is noticeable
Gas Chromatograph/Mass Spectrometer	•Autotune Report	Inspected daily
Gas Chromatograph/Mass Spectrometer	•Clean ion source	As needed to maintain high mass resolution
Gas Chromatograph/Mass Spectrometer	•Replace vacuum pump oil	Every 6 months

INSTRUMENT	P. M. DESCRIPTION	FREQUENCY
Gas Chromatographs/Mass Spectrometer & Gas Chromatographs	•Replace septa and liner	As needed to maintain injection port inert
Gas Chromatographs/Mass Spectrometer & Gas Chromatographs	•Replace column	When separation begins to degrade
High Intensity Ultrasonic Processor - Misonix	•Check tuning criteria	Daily with use
Infrared Spectrophotometer - Foxboro Miran 1A	•Optics alignment or replacement	As needed when response begins to deteriorate

8.3 STANDARDS AND REAGENTS

Table 8.3A: Standard stock sources, description and calibration information.
This table is subject to revision without notice

Method	Vendor*	Description	Calibration	Storage Req.	Expiration
8310	Ultra	Aromatic Hydrocarbon	Primary	4° ± 2°C	6 months
	NSI	8310/610 Spike	Second Source	4° ± 2°C	6 months
DRO	NSI	DRO #2 Cal Mix	Primary	-10°C to –20°C	6 months
	NSI	DRO #2 Spike	Second Source	-10°C to –20°C	6 months
EPH TN DRO	NSI	TN-EPH Calibration Mix	Primary	-10°C to –20°C	6 months
	NSI	EPH-TN Spike	Second Source	-10°C to –20°C	6 months
RRO	NSI	30W Oil	Primary	-10°C to –20°C	6 months
PCB	Accustd	Aroclor PCB Kit	Primary	4° ± 2°C	6 months
	NSI	1260 Spike	Second Source	4° ± 2°C	6 months
Chlordane	Restek	Chlordane Mix	Primary	4° ± 2°C	6 months
Toxaphene	Restek	Toxaphene	Primary	4° ± 2°C	6 months
Pesticides	Ultra	Pest Mix	Primary	4° ± 2°C	6 months
	NSI	Pest Spike Mix	Second Source	4° ± 2°C	6 months
Herbicides	NSI	Custom Herbicide Mis	Primary	4° ± 2°C	6 months
	NSI	Herb Spike Mix	Second Source	4° ± 2°C	6 months
	Ultra/NSI	OP Cal Mix A, B	Primary	4° ± 2°C	6 months
	NSI	OP Spike Mix A, B	Second Source	4° ± 2°C	6 months
507 NP Pest	Ultra/NSI	507 Cal Mix	Primary	4° ± 2°C	2 months
	NSI	NP Pest Spike	Second Source	4° ± 2°C	2 months
THAA	Ultra/Accustd	HAA Cal Mix	Primary	-10°C to –20°C	6 months
	Accustd/NSI	HAA Spike	Second Source	-10°C to –20°C	6 months
8270	Ultra	Custom Std Mega Mix	Primary	4° ± 2°C	6 months
	Restek	Spike Mix	Second Source	4° ± 2°C	6 months
8330	Restek	Mix1, Mix2, PETN	Primary	4° ± 2°C	6 months
	Ultra, Chemservice	Mix1, Mix2, PETN	Second Source	4° ± 2°C	6 months
8011, 504.1	Accustd	504.1 Cal Mix	Primary	4° ± 2°C	1 month

Table 8.3A: Standard stock sources, description and calibration information.

This table is subject to revision without notice

Method	Vendor*	Description	Calibration	Storage Req.	Expiration
	NSI	Spike Mix	Second Source	4° ± 2°C	1 month
Sulfolane, 8270C	Sigma Aldrich	Calibration Mix	Primary	4° ± 2°C	6 months
	Restek	Spike Mix	Second source	4° ± 2°C	6 months
Glycol, 8015	Chemservice	Calibration Mix	Primary	4° ± 2°C	6 months
	Chemservice	Spike Mix	Second source	4° ± 2°C	6 months
Industrial Hygiene	Chemservice	Neat	Primary & Secondary	4° ± 2°C	6 months

**Equivalent Providers may be utilized.*

TABLE 8.3B: Working Standard Concentrations
This table is subject to revision without notice

Organic Compounds	Method #	Standard Concentrations	Storage Requirements	Expiration
Semi-Volatiles	625, SM6410B 20th, 8270C/D	1,2,4,8,12,16,20,30,40,50,80 (low level and regular)	4° ± 2°C	6 months
Semi-Volatiles: RV/LVI	625, SM6410B 20th, 8270C/D	10,20,50,100,200,500,1000,2000 ug/L	4° ± 2°C	6 months
PCBs 1016/1260	608, SM6431B 20th, 8082	0.05, 0.1, 0.25, 0.5, 0.75, 1.0 µg/mL	4° ± 2°C	6 months
PCBs: RV	608, SM6431B 20th, 8082	2.0,4.0,5.0,10,20,50 µg/L	4° ± 2°C	6 months
Pesticides	608, SM 6630C, 8081A	0.05, 0.10, 0.20, 0.40, 0.60, 0.80 µg/mL	4° ± 2°C	6 months
Pesticides: RV	608, SM 6630C, 8081A,	0.5,1.0,2.0,5.0,10,15,20 µg/L	4° ± 2°C	6 months
Chlordane and/or Toxaphene	608, SM 6630C, 8081A	0.1, 0.5, 1.0, 2.5, 5.0, 10.0 µg/mL	4° ± 2°C	6 months
Chlordane and/or Toxaphene	608, SM 6630C, 8081A,	10,20,50,100,150,200 µg/L	4° ± 2°C	6 months
Sulfolane	8270C/D	4,8,10,20,50,100,200,500 ug/L	4° ± 2°C	6 months
PCB Arochlors 1221, 1232, 1242, 1248, 1254	8082	5.0 µg/mL	4° ± 2°C	6 months
Herbicides	8151A, SM6640C 20th	0.02, 0.05, 0.1, 0.2, 0.5, 1.0 mg/L	4° ± 2°C	6 months
OP and NP Pesticides	507 by dual-NPD, 1657A, 8141A by dual-FPD	1.0, 2.0, 5.0, 10.0, 15.0, 20.0 ug/L	4° ± 2°C	6 months
PAHs	8310, 610, SM6440B 20th 8270C/D SIM	0.04, 0.20,1.0,5.0,8.0,20.0,30.0,40.0 ug/L 0.025, 0.05, 0.10, 0.50, 2.0, 4.0, 10.0, 20.0 ug/L	4° ± 2°C	6 months
PAHs: RV/LVI	8270C/D SIM	4.0,20,40,100,160,400,600,800 ug/L 1.0,5.0,10,20,40,80,200 ug/L	4° ± 2°C	6 months
Nitroaromatics & Nitramines	8330	.05, 0.1, 0.25, 0.5, 2.0, 5.0, 10.0, 25.0 mg/L	NA*	NA*
EPHTN	EPH TN	10000, 6000, 4000, 2000, 1000, 400, 200, 100 mg/L	NA*	NA*
DRO	OA2 , 8015Mod, LA TPH D, LA TPH O, OHIO DRO	10000, 5000, 3000, 2000, 1000, 400, 200, 100 mg/L	NA*	NA*
Diesel/M.O: RV/LVI	EPH TN OA2 , 8015Mod,	2.0,4.0,8.0,20,40,80,100,200 mg/L	NA*	NA*

TABLE 8.3B: Working Standard Concentrations
This table is subject to revision without notice

Organic Compounds	Method #	Standard Concentrations	Storage Requirements	Expiration
	LA TPH D, LA TPH O, OHIO DRO			
DRO	DRO/CA LUFT/CO	2.0,4.0,10,20,40,60,100,200 mg/L	NA*	NA*
DROMO: LVI PAHMO: LVI	MO DRO/PAH by 8270	5.0,10,20,40,80,120,160,200 mg/L 4.0,20,40,100,160,400,600,800 ug/L	4° ± 2°C	6 months
MADEP EPH	MADEP EPH	Aromatics C11-C22: 17, 85, 425, 850, 1700, 3400, 6800 mg/L Aliphatic C9 - C18: 6, 30, 150, 300, 600, 1200, 2400 mg/L Aliphatic C19 - C36: 8, 40, 200, 800, 1600, 3200 mg/L	NA*	NA*
EDB, DBCP, TCP	8011, 504.1	0.01, 0.02, 0.05, 0.10, 0.25, 0.5	NA*	NA*
THAAs	552.2	1, 2, 4, 10, 20, 30, 40, 50 ug/L	NA*	NA*
FL PRO	FL PRO	85, 850, 2550, 4250, 5950, 8500 mg/l	NA*	NA*
Glycols	8015B/C/D - Modified	1.5,7.5,15,30,45,60 ppm	NA*	NA*
TX TPH	TX1005	Individual Ranges- 4.5, 10, 25, 50, 125, 250, 500, 1250, 2500 ppm. Total Range- 9.0, 20, 50, 100, 250, 500, 1000, 2500, 5000 ppm.	NA*	NA*
IH - Aromatics	NIOSH/OSHA.	10-10000 ug/sample	NA*	NA*
DROMO PAHMO	MO DRO/PAH by 8270	300, 500, 1000, 2000, 4000, 6000, 8000, 10000 mg/L 1.0, 5.0, 10, 20, 40, 60, 80, 100 ug/L	4° ± 2°C	6 months

* indicates solutions are prepared fresh daily as needed.

8.4 INSTRUMENT CALIBRATION

608/8081A or B/SM6630C - Chlorinated Pesticides – SOP Number 330344

The gas chromatograph is calibrated using either the internal or external standard calibration model. A standard curve is prepared using a minimum of three concentration levels for each compound of interest for method 608. A minimum of five concentration levels is necessary for methods 8081A/B and SM6630C. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration or ISTD response for each compound and calibration/response factors are calculated. If performing analysis by method 608 and the response factors of the initial calibration are < 10 % RSD for method 608 and 20% RSD for methods 8081A/B and 6630C over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990.

During the analytical sequence, the stability of the initial calibration curve is verified, following every 20th sample, by the analysis of a continuing calibration verification (CCV) standard. The CCV must recover within 15% of the expected concentration for each analyte. The concentration of the continuing check standard must be routinely varied to verify the entire calibration range.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of initial calibration verification standard (ICV). If the response for any analyte in this check varies from the predicted response by more than $\pm$15%, the analysis must be repeated using fresh standard. If the standard still does not meet the acceptance criteria, a new initial calibration curve must be generated.

An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should recover within $\pm$20% of the expected concentration for each analyte. When analyte responses in field samples exceed the calibration range, the sample is diluted and re-analyzed.

Degradation if DDT and Endrin are also verified at least every 12hr window. Breakdown should recover less 20% of the total injection.

507 - Nitrogen/Phosphorus Pesticides - SOP Number 330348

The gas chromatograph is calibrated using the external standard procedure. A standard curve is prepared using a minimum of three concentration levels for each compound of interest for method 507. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are ≤20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990.

During the analytical sequence the stability of the initial calibration is verified, following every 10^{th} sample and at the end of the sequence, by the analysis of a continuing calibration verification (CCV) standard. The CCV must recovery within 20% of the expected concentration for each analyte. The concentration of the continuing check standard must be routinely varied to verify the entire calibration range.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies by more than ±20% from the initial calibration, the analysis must be repeated using fresh standard. If the standard still does not meet the criteria, a new initial calibration curve must be generated.

A Quality Control Sample (QCS) is analyzed at minimum quarterly to verify calibration standards.

552.2 - HAA - SOP Number 330319

The gas chromatograph is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of five concentration levels for each compound of interest. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are ≤20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990.

During the analytical sequence the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of a continuing calibration verification (CCV) standard. The response of the analytes in the CCV must not vary more than 30% from the initial calibration.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies by more than ±30% from the initial calibration, the analysis must be repeated using fresh standard. If the standard still does not meet the criteria, a new initial calibration curve must be analyzed.

A Quality Control Sample (QCS) is analyzed at minimum quarterly to verify calibration standards.

8151A, SM6640B – Herbicides - SOP Number 330320

The gas chromatograph is calibrated using the external standard procedure. A standard curve is prepared using a minimum of five concentration levels for each analyte of interest. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are ≤20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990.

During the analytical sequence, the stability of the initial calibration is verified following every 10th sample and at the end of the sequence by the analysis of a continuing calibration verification (CCV) standard. The CCV must recovery within 15% of the expected concentration for each analyte for method 8151A and within 20% for method 6640C. The value of the CCV can exceed the criteria for a single compound provided that all samples in the analytical batch are BDL (below detection limit). The concentration of the continuing check standard must be routinely varied to verify the entire calibration range.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies from the predicted response by more than ±15%, the analysis must be repeated using fresh standard. If the standard still does not meet the criteria, a new initial calibration curve must be generated.

An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should recover within ±20% of the expected concentration for each analyte. When sample responses exceed the calibration range, the sample is diluted and re-analyzed.

8141A, 1657A – Organophosphorus Pesticides - SOP Number 330318

The gas chromatograph is calibrated using the external standard procedure. A standard curve is prepared using a minimum of five concentration levels for each analyte of interest. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are ≤20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990.

During the analytical sequence, the stability of the initial calibration is verified following every 10th sample and at the end of the sequence by the analysis of a continuing calibration verification (CCV) standard. The CCV must recovery within 15% of the expected concentration for each analyte. The concentration of the continuing check standard must be routinely varied to verify the entire calibration range.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies from the predicted response by more than ±15%, the analysis must be repeated using fresh standard. If the standard still does not meet the criteria, a new initial calibration curve must be generated.

An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should recover within ±20% of the expected concentration for each analyte. When sample responses exceed the calibration range, the sample is diluted and re-analyzed.

625, 8270C or D, SM6410B - Base/Neutrals/Acids by GC/MS: Semivolatile Organics – SOP Number 330345

Detector mass calibration is performed using the autotune function of the GC/MS analytical system and PFTBA (Perfluorotributylamine). Following verification of the appropriate masses, the instrument sensitivity is verified by injecting a tuning solution containing decafluorotriphenylphosphine (DFTPP), benzidine, pentachlorophenol and DDT. The DFTPP must meet the ion abundance criteria specified by the EPA published method.

Benzidine and pentachlorophenol are reviewed for tailing and DDT is reviewed for breakdown to DDE and DDD. Successful tuning must occur every 12 hours for method 8270C/D and every 24 hours for method 625, except where noted in the determinative SOP.

Following successful tuning, the GC/MS is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of three standards for method 625 and five standards for method 8270C/D and SM6410B. The calibration standards are tabulated according to peak height or area against concentration and the concentrations and responses of the internal standard analytes. The results are used to determine a response factor for each analyte in each standard injected. A calibration curve is the constructed and is determined to be acceptable if each analyte meets the criteria specified in the determinative method. When this condition is met, linearity through the origin can be assumed and the average RF can be used in place of a calibration curve. Initial calibration that does not meet these requirements will not be accepted and recalibration must be performed. Linear regression can be used for target compounds exceeding the 15% criteria, providing that the correlation coefficient is 0.990 or better. USACE projects must meet a correlation coefficient of 0.995 or better. The initial calibration range must represent the typical environmental sample and include the RL as the lowest calibration point. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range.

A second source calibration verification standard is analyzed after each calibration and should recover within 20% for all CCC compounds and within 50% for other analytes of interest for 8270C. All analytes must recover +/- 30% for 8270D.. Following successful calibration, the analysis of field and QC samples may begin. Analysis may be performed only during the timeframe of a valid tuning cycle (12 hours for 8270C/D and 24 hours for 625). Following the expiration of the tuning clock, the instrument must be retuned and either re-calibrated or existing calibration may be re-verified.

For 8270C/D analyses, daily calibration verification includes successful demonstration of DFTPP sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest. The DFTPP tune must meet the ion abundance criteria specified within the published method. . Each internal standard in the CCV must recover between -50% to + 100%, when compared to the same internal standard compound in the mid-point standard of the initial calibration curve. Additionally, if the retention time of an internal standard changes by more than 30 seconds from the retention time of the same internal standard in the mid-level standard of the most recent initial calibration, the system must be evaluated, corrected, and possibly re-calibrated.

For 625 analyses, daily calibration verification is accomplished by a successful demonstration of DFTPP sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest. The DFTPP tune must meet the same ion abundance criteria as the 8270C analysis and the CCV standard must recover within 20 % of predicted response for all analytes of interest.

8310, 610, SM6640B - PAHs by HPLC - SOP Number 330322

610: A standard curve is prepared using a minimum of three concentration levels for each compound of interest. If the response factors are < 10 % RSD over the working range, the average RF can be used for calculations

8310 & SM6640B: Perform calibration using a minimum of 5 points. If the response factors are < 20 % RSD over the working range, the average RF can be used for calculations or linear regression may be used providing that the correlation coefficient for each analyte of interest is 0.990 or better. USACE projects must meet a correlation coefficient of 0.995 or better. The regression line must never be forced through the origin.

The initial calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. Alternatively, the results can be used to plot a calibration curve of response ratios (Area/Ref. Area) vs (Amt./Ref Amt.). The calibration range must represent the typical environmental sample and include the RL as the lowest calibration point. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range. A second source calibration verification standard is analyzed after each calibration and should meet criteria of $\pm$20%.

A continuing calibration verification (CCV) must be run at the beginning of each run and every 10 samples thereafter. The continuing calibration standard is prepared from the same source as the calibration curve and must perform within $\pm$15% of the actual value. The CCV must represent the midpoint of the calibration range.

8330A/B/C – Nitroaromatics/Nitrosamines - SOP Number 330323

A standard curve is prepared using a minimum of five concentration levels for each compound of interest. Experience indicates that a linear calibration curve with zero intercept is appropriate for each analyte. Therefore, a response factor for each analyte can be taken as the slope of the best-fit regression line. The correlation coefficient for each analyte of interest is 0.990 or better. The calibration range must represent the typical environmental sample and include the RL as the lowest calibration point. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range. A second source calibration verification standard is analyzed after each calibration and should meet the criteria of $\pm$20%.

Daily calibration is accomplished through the analysis of midpoint calibration standards, at a minimum, at the beginning of the day, and singly after the last sample of the day (assuming a sample group of 10 samples or less). Obtain the response factor for each analyte from the mean peak heights or peak areas and compare it with the response factor obtained for the initial calibration. The mean response factor for the daily calibration must agree within ±20% of the response factor of the initial calibration. If this requirement is not met, a new initial calibration must be obtained.

8015B/C/D or State Specific Method - DRO/RRO - Various SOPs

Certain state accreditation/registration programs may have specific requirements for calibration and analysis that must be met. Those requirements supersede the general guidance provided in this section and are addressed in the determinative SOP. Generally, for 8015B/C/D analysis, the gas chromatograph is calibrated using the external standard procedure. A standard curve is prepared using a minimum of five concentration levels for each analyte of interest. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are $\leq$20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990. USACE projects must meet a correlation coefficient of 0.995 or better.

During the analytical sequence, the stability of the initial calibration is verified following every 10th sample and at the end of the sequence by the analysis of a continuing calibration verification (CCV) standard. Typically, the CCV must recovery within 15% of the expected concentration for each analyte for method 8015B/C/D; however state specific limits for the CCV may vary. See the specific SOP or published method for more guidance. The concentration of the continuing check standard must be routinely varied to verify the entire calibration range.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies from the predicted response by more than ±15% of the expected concentration for each analyte for method 8015B/C/D or more than state specified limits, the analysis must be repeated using fresh standard. If the standard still does not meet the criteria, a new initial calibration curve must be generated.

An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should meet criteria of ±20% of the expected concentration for each analyte. When sample responses exceed the range of the standard curve, the sample is diluted to a concentration suspected to be within the calibration range and re-analyzed.

NIOSH 1501 modified – Aromatic Hydrocarbons in Air - SOP Number 330303

The gas chromatograph is calibrated using the external standard procedure. A standard curve is prepared using a minimum of six concentration levels for each analyte of interest. The calibration range must represent the typical sample concentration. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are ≤15% RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990. When sample responses exceed the range of the standard curve, the sample is diluted and re-analyzed. A mid-level independently prepared calibration verification standard (ICV) is analyzed following each initial calibration and should meet criteria of ±15% of the expected concentration for each analyte. Following each 10 samples and at the end of the analytical sequence, a continuing calibration verification standard is analyzed to demonstrate the continued stability of the analytical sequence. This standard should meet criteria of ±15% of the expected concentration for each analyte.

An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should meet criteria of ±20% of the expected concentration for each analyte. When sample responses exceed the range of the standard curve, the sample is diluted to a concentration suspected to be within the calibration range and re-analyzed.

Desorption Efficiency for each lot of sorbent media is determined for each analyte of interest. Desorption Efficiency for analytes on badges has been determined and is available from the manufacturer. The reporting limit from media must be verified with each batch of samples analyzed. Additionally, a Laboratory Control Sample pair (LCS & LCSD) is prepared on media for each batch of samples analyzed.

8.5 ACCEPTANCE/REJECTION OF CALIBRATION

Organic Chemistry

The initial calibration curve is compared with previous curves for the same analyte. All new standard curves are immediately checked with a secondary source or laboratory control standard prepared from a separate source than those used for calibration. All curves are visually reviewed to ensure that acceptable correlation represents linearity. Calibration curves may be rejected for nonlinearity, abnormal sensitivity, or poor response of the laboratory control standard.

Continuing calibration verification is performed on each day that initial calibration is not performed and following every tenth sample. If a check standard does not perform within established criteria then the instrument will undergo an evaluation to determine the cause. Once the issue is corrected, all samples between the last in control standard and the first out of control check will be re-analyzed.

TABLE 8.5: INSTRUMENT CALIBRATION

Instrument (Analysis)	Calibration Type	Minimum Number of Standards	Type of Curve	Acceptance/ Rejection Criteria	Frequency
Gas Chromatography (Pest/PCB, Herbicides, Organophos/ Organonitrogen Pesticides)	Initial	3 (600 series methods) - 5 (other) cal.stds	Avg. RF or Linear	8081A, 8151A, 6640C, 8141A, 657A: Must be ≤20% RSD 608 - ≤10% RSD	As needed
	Second Source	1 Second Source		+/- 20% of true value	With each calibration
	Daily / Continuing	OPPEST/HERB1/10 P/PCB 1/20		Must be within 15% of the initial calibration curve, 20% for 6640C.	Beginning, every 10 and ending for external cal. Every 20 samples for internal cal
HPLC (PAH and Explosive)	Initial	3 (600 series methods) 5 (other) cal.stds	Avg. RF or Linear	8310, 8330: Must be ≤20% RSD 610 - ≤10% RSD	As needed
	Second Source	1 Second Source		+/- 20% of true value	With each calibration
	Daily / Continuing	1/10		Must be within 15% of the initial calibration curve.	Beginning, every 10 and ending.
GC/MS Semi-volatiles 8270C/D	Initial	At least 5 cal. stds	Avg. RF or Linear	8270C - Must be ≤15% RSD, CCCs must be ≤ 30% RSD, Linear regression: 0.990 per method or 0.995 for USACE 8270D - Must be ≤20% RSD for target analytes, Linear regression: 0.990 per method or 0.995 for USACE	As needed
	Second Source	1 Second Source		8270C: Should recover within 20% for all CCC compounds and within 50% for other analytes of interest, with the exception of analytes known to perform poorly 8270D: Should recover w/in 30% for all	With each calibration
	Daily / Continuing	Tune & CCV		Must pass established method criteria. See SOP.	Every 12 hours per method
GC/MS Semi-volatiles 625	Initial	3 cal.stds	Avg. RF or Linear	625 - ≤35% RSD all compounds	As needed
	Second Source	1 Second Source		Should recover within 20% for all CCC compounds and within 50% for other analytes of interest, with the exception of analytes known to perform poorly	With each calibration
	Daily / Continuing	Tune & CCV every 24 hours		Must pass established method tuning criteria; 625: CCV must be ≤20% difference for all compounds,	Every 24 hours

TABLE 8.5: INSTRUMENT CALIBRATION					
Instrument (Analysis)	**Calibration Type**	**Minimum Number of Standards**	**Type of Curve**	**Acceptance/ Rejection Criteria**	**Frequency**
HAA 552.2	Initial	5 cal.stds	Avg. RF or Linear	≤30% RSD all compounds	As needed
	Second Source(QCS)	1 Second Source		±30% of true value	Quarterly
	Daily / Continuing	1/10		CCV must be ≤30% difference for all compounds,	Beginning, every 10 and ending
Pesticides 507	Initial	5 cal.stds	Avg. RF or Linear	≤20% RSD all compounds	As needed
	Second Source(QCS)	1 Second Source		±20% of true value	Quarterly
	Daily / Continuing	1/10		CCV must be ≤20% difference for all compounds,	Beginning, every 10 and ending
DRO –8015, State Programs* * Or per state requirement	Initial	5 cal.stds	Avg. RF or Linear	8015B/C/D - ≤20% RSD all compounds	As needed
	Second Source	1 Second Source		±20% of true value	With each calibration
	Daily / Continuing	1/10		CCV must be ≤15% difference for all compounds,	Beginning, every 10 and ending
NIOSH 1501 mod.	Initial	6 cal.stds	Avg. RF or Linear	≤15% RSD all compounds	Daily
	ICV	1 Independent Prep.		±15% of true value	With each calibration
	Continuing	1/10		±15% of true value	Beginning, every 10 and ending

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

ASTM Type I grade water.

9.2 GLASSWARE WASHING AND STERILIZATION PROCEDURES

Organic laboratory glassware is washed in a non-phosphate detergent and warm tap water. Before washing, all writing and large deposits of grease are removed with acetone. Glassware is then rinsed with: tap water, "No Chromix" solution, tap water, and deionized (DI) water. It is then solvent rinsed in the following order: acetone, and then methylene chloride. Glassware is stored in designated drawers or on shelves, inverted if possible. All glassware is rinsed with the required solvent for the particular extraction protocol prior to use.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the semi-volatile laboratory can be found in the following table:

TABLE 10.1: SEMI-VOLATILE DEPARTMENT SOPS

This table is subject to revision without notice

SOP #	Title
	Preparatory SOPs
330702	Separatory Funnel Liquid-Liquid Extraction 3510C
330702A	Separatory Funnel Liquid-Liquid Extraction 3510C for Minnesota Samples
330702B	Reduced Volume Separatory Funnel Liquid-Liquid Extraction 3510C
330705	Ultrasonic Extraction 3550B
330707	Microwave Extraction 3546
330708	Buchi Syncore Concentration System
330743	Solid Phase Extraction
330754	Waste Dilution for SVOCs 3580A
330755	PCB in Oil Waste Dilution
	Extract Cleanup SOPs
330739	Silica Gel Cleanup 3630C
330740	Acid Cleanup 3665A
330741	Sulfur Cleanup 3660C
330742	Florisil Cleanup 3620B
	Semi-Volatiles Analysis SOPs
330303	Organics on Charcoal Tubes (includes badges)
330317	Sulfolane
330318	Organophosphorus Pesticides 8141A/ 1657A/ 614/ 622
330319	THAAs 552.2
330320	Chlorinated Herbicides by Gas Chromatography 8151A/ SM6640B
330322	PAH's by HPLC 8310/ 610/ SM6440B
330323	Explosives by HPLC 8330
330324	Carbamates by HPLC 531.1/ SM6610B
330343	PCBs 8082 & A
330344	Pesticides and PCBS by Gas Chromatography 8081A&B/ 608/ SM6630C
330345	Semi-volatile Organics by GC/MS using Capillary Column 8270C & D/ 625/ SM6410B
330346	EDB in Drinking Water by GC ECD 8011/ 504.1
330348	NP Pesticides in Drinking Water by GC NPD 507
330352	Method for Determination of Extractable Petroleum Hydrocarbons by GC/FID – DRO-KY, TN EPH, TPH-AZ, DRO CA and OH by Modified Method 8015. Includes Wyoming LAUST Requirements
330353	NC/MA/NJ/MT - Extractable Petroleum Hydrocarbons
330355	Florida PRO, WI DRO and CT ETPH
330356	TX TPH 1005/1006
330358	OA2 & NWTPH-Dx
330359	AK 102/103
330360	DRO Wisconsin/Minnesota
330361	Glycols

11.0 QUALITY CONTROL CHECKS

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

11.1 ESC participates in proficiency testing (PT's) in support of various laboratory accreditations/recognitions. Environmental samples are purchased from Environmental Resource Associates (ERA). The WS, WP and solid matrix studies are completed every 6 months. For industrial hygiene accreditation, PTs are administered by AIHA. PT samples are received and analyzed by method according to the vendor's instructions and according to ESC SOP.

11.2 Initial Demonstrations of Capability (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing Demonstration of Capability (CDOCs) must be updated at least annually. The associated data is filed within the department and available for review.

11.3 Matrix Spike and Matrix Spike Duplicates are performed on each batch of samples analyzed depending on analytical method requested.

11.4 A Laboratory Control Sample (LCS) and LCS Duplicate are analyzed one per batch of samples.

11.5 A method preparation blank is performed per batch of samples processed. If one-half the reporting limit [RL] is exceeded, the laboratory shall evaluate whether re-processing of the samples is necessary, based on the following criteria:

- The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparation batch or
- The blank contamination is greater than 1/10 of the specified regulatory limit.

The concentrations of common laboratory contaminants shall not exceed the reporting limit. Any samples associated with a blank that fail these criteria shall be reprocessed in a subsequent preparation batch, except when the sample analysis resulted in non-detected results for the failing analytes.

11.6 For Industrial Hygiene analyses (sorbent tubes and badges), a media blank will be prepared with each batch of samples. In addition, a media reporting limit verification will be prepared with each batch of samples. For accuracy and precision determinations, a LCS/LCSD pair will be spiked on media then desorbed and analyzed concurrently with every batch of field samples.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in *SOP 030201 Data Handling and Reporting.* The Quality Control Department performs the secondary review of the data package using the ESC SOP #030227, *Data Review.* The QC Reviewer verifies that the analysis has performed as required and meets method criteria, all associate data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required flags on test reports, etc.)

TABLE 12.1 Data Reduction Formulas

PARAMETER	FORMULA
GC and HPLC	response of sample analyte {*area*} x final extract volume {*mL*} x dilution response factor {*area/(mg/mL)*} x initial extract volume-mass {*mL or g*} *Calculations performed by HP Enviroquant Software*
GC/MS	response of analyte {*area*} x extract volume {*mL*} x dilution x int. std amt. {*area*} response factor {*area/(mg/mL)*} x initial volume-mass {*mL or g*} x int. std cal. {area} *Calculations performed by HP Enviroquant Software*
GC - IH	Sample conc. (front tube + back tube) (*ug*) – blank conc. (front tube + back tube) (*ug*) Volume of air sampled (*L*)

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.3 by method for current QC targets and controls and current reporting limits.

Marginal Exceedance – When a large number of analytes exist in the LCS, it is statistically possible for a few analytes to be outside established control limits while the analytical system remains in control. These excursions must be random in nature and, if not, a review of the control limits or analytical process is necessary.

Upper and lower marginal exceedance (ME) limits are established as the mean of at least 20 data points ± four times their standard deviations. The number of allowable marginal exceedances per event is based on the number of analytes spiked in the LCS.

Allowable Marginal Exceedance per Event	
Analytes in LCS:	**ME Allowable**
>90	5
71-90	4
51-70	3
31-50	2
11-30	1
<11	0

Organic Control Limits - The organic QC targets are statutory in nature; warning and control limits for organic analyses are initially set for groups of compounds based on preliminary method validation data. When additional data becomes available, the QC targets are reviewed. All QC targets are routinely re-evaluated at least annually (and updated, if necessary) against laboratory historical data to insure that the limits continue to reflect realistic, method achievable goals.

12.3 REPORTING

Reporting procedures are documented in *SOP 030201 Data Handling and Reporting.*

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Pesticides	Azinphos-Methyl	8141A, 1657A	GW	49-126	27	0.001	mg/L
Pesticides	Bolstar (Sulprofos)	8141A, 1657A	GW	49-122	25	0.001	mg/L
Pesticides	Chlorpyrifos	8141A, 1657A	GW	46-124	25	0.001	mg/L
Pesticides	Coumaphos	8141A, 1657A	GW	49-126	26	0.001	mg/L
Pesticides	Demeton,-O And -S	8141A, 1657A	GW	10-105	23	0.002	mg/L
Pesticides	Diazinon	8141A, 1657A	GW	43-143	23	0.001	mg/L
Pesticides	Dichlorvos	8141A, 1657A	GW	41-113	21	0.002	mg/L
Pesticides	Dimethoate	8141A, 1657A	GW	18-104	34	0.001	mg/L
Pesticides	Disulfoton	8141A, 1657A	GW	45-123	23	0.001	mg/L
Pesticides	Epn	8141A, 1657A	GW	51-130	27	0.001	mg/L
Pesticides	Ethoprop	8141A, 1657A	GW	42-125	21	0.001	mg/L
Pesticides	Ethyl Parathion	8141A, 1657A	GW	55-122	24	0.001	mg/L
Pesticides	Fensulfothion	8141A, 1657A	GW	23-133	35	0.001	mg/L
Pesticides	Fenthion	8141A, 1657A	GW	42-128	24	0.001	mg/L
Pesticides	Malathion	8141A, 1657A	GW	53-120	24	0.001	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Pesticides	Merphos	8141A, 1657A	GW	10-177	34	0.001	mg/L
Pesticides	Methyl Parathion	8141A, 1657A	GW	47-126	25	0.001	mg/L
Pesticides	Mevinphos	8141A, 1657A	GW	41-134	23	0.001	mg/L
Pesticides	Naled	8141A, 1657A	GW	17-155	25	0.001	mg/L
Pesticides	Phorate	8141A, 1657A	GW	30-139	22	0.001	mg/L
Pesticides	Ronnel	8141A, 1657A	GW	45-120	23	0.001	mg/L
Pesticides	Stirophos	8141A, 1657A	GW	47-127	26	0.001	mg/L
Pesticides	Sulfotep	8141A, 1657A	GW	51-122	23	0.001	mg/L
Pesticides	Tepp	8141A, 1657A	GW	10-137	40	0.0083	mg/L
Pesticides	Tokuthion (Prothiofos)	8141A, 1657A	GW	47-122	24	0.001	mg/L
Pesticides	Trichloronate	8141A, 1657A	GW	41-122	24	0.001	mg/L
Pesticides	Azinphos-Methyl	8141A	SS	50-127	37	0.1	mg/Kg
Pesticides	Bolstar (Sulprofos)	8141A	SS	55-120	33	0.1	mg/Kg
Pesticides	Chlorpyrifos	8141A	SS	56-117	28	0.1	mg/Kg
Pesticides	Coumaphos	8141A	SS	50-126	36	0.1	mg/Kg
Pesticides	Demeton,-O And -S	8141A	SS	19-153	25	0.1	mg/Kg
Pesticides	Diazinon	8141A	SS	43-133	28	0.1	mg/Kg
Pesticides	Dichlorvos	8141A	SS	22-116	32	0.1	mg/Kg
Pesticides	Dimethoate	8141A	SS	10-142	36	0.1	mg/Kg
Pesticides	Disulfoton	8141A	SS	52-115	24	0.1	mg/Kg
Pesticides	Epn	8141A	SS	48-139	35	0.1	mg/Kg
Pesticides	Ethoprop	8141A	SS	53-112	25	0.1	mg/Kg
Pesticides	Ethyl Parathion	8141A	SS	52-133	29	0.1	mg/Kg
Pesticides	Fensulfothion	8141A	SS	26-120	40	0.1	mg/Kg
Pesticides	Fenthion	8141A	SS	54-121	29	0.1	mg/Kg
Pesticides	Malathion	8141A	SS	52-123	29	0.1	mg/Kg
Pesticides	Merphos	8141A	SS	10-193	33	0.1	mg/Kg
Pesticides	Methyl Parathion	8141A	SS	55-119	29	0.1	mg/Kg
Pesticides	Mevinphos	8141A	SS	34-114	29	0.1	mg/Kg
Pesticides	Naled	8141A	SS	10-132	40	0.1	mg/Kg
Pesticides	Phorate	8141A	SS	54-115	24	0.1	mg/Kg
Pesticides	Ronnel	8141A	SS	53-112	27	0.1	mg/Kg
Pesticides	Stirophos	8141A	SS	51-120	35	0.1	mg/Kg
Pesticides	Sulfotep	8141A	SS	52-124	23	0.1	mg/Kg
Pesticides	Tepp	8141A	SS	10-85	40	0.1	mg/Kg
Pesticides	Tokuthion (Prothiofos)	8141A	SS	52-124	31	0.1	mg/Kg
Pesticides	Trichloronate	8141A	SS	50-118	33	0.1	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Pesticides	Alachlor	507	DW	70-130	25	0.0002	mg/L
Pesticides	Atrazine	507	DW	70-130	25	0.0001	mg/L
Pesticides	Butachlor	507	DW	70-130	25	0.0001	mg/L
Pesticides	Metolachlor	507	DW	70-130	25	0.0002	mg/L
Pesticides	Metribuzin	507	DW	70-130	25	0.0002	mg/L
Pesticides	Simazine	507	DW	70-130	25	7.00E-05	mg/L
Pesticides	4,4-DDD	608/8081A/B, 6630C	GW, WW	60-123	20	0.00005	mg/L
Pesticides	4,4-DDE	608/8081A/B, 6630C	GW, WW	50-120	22	0.00005	mg/L
Pesticides	4,4-DDT	608/8081A/B, 6630C	GW, WW	61-121	20	0.00005	mg/L
Pesticides	Aldrin	608/8081A/B, 6630C	GW, WW	10-136	33	0.00005	mg/L
Pesticides	Alpha BHC	608/8081A/B, 6630C	GW, WW	58-114	21	0.00005	mg/L
Pesticides	Beta BHC	608/8081A/B, 6630C	GW, WW	61-120	20	0.00005	mg/L
Pesticides	Alpha Chlordane	608/8081A/B, 6630C	GW, WW	51-117	21	0.005	mg/L
Pesticides	Delta BHC	608/8081A/B, 6630C	GW, WW	57-120	21	0.00005	mg/L
Pesticides	Dieldrin	608/8081A/B, 6630C	GW, WW	62-123	20	0.00005	mg/L
Pesticides	Endosulfan I	608/8081A/B, 6630C	GW, WW	63-123	20	0.00005	mg/L
Pesticides	Endosulfan II	608/8081A/B, 6630C	GW, WW	63-124	20	0.00005	mg/L
Pesticides	Endosulfan Sulfate	608/8081A/B, 6630C	GW, WW	59-125	21	0.00005	mg/L
Pesticides	Endrin	608/8081A/B, 6630C	GW, WW	60-123	20	0.00005	mg/L
Pesticides	Endrin Aldehyde	608/8081A/B, 6630C	GW, WW	42-92	21	0.00005	mg/L
Pesticides	Endrin Ketone	608/8081A/B, 6630C	GW, WW	60-117	20	0.00005	mg/L
Pesticides	Gamma BHC	608/8081A/B, 6630C	GW, WW	59-116	20	0.00005	mg/L
Pesticides	Heptachlor	608/8081A/B, 6630C	GW, WW	10-131	28	0.00005	mg/L
Pesticides	Heptachlor Epoxide	608/8081A/B, 6630C	GW, WW	61-118	20	0.00005	mg/L
Pesticides	Hexachlorobenzene	608/8081A/B, 6630C	GW, WW	28-116	27	0.00005	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Pesticides	Methoxychlor	608/8081A/B, 6630C	GW, WW	66-122	20	0.00005	mg/L
Pesticides	Toxaphene	608/8081A/B, 6630C	GW, WW	-	-	0.0005	mg/L
PCBs	PCB 1016	608, 6431B, 8082/A	GW, WW	32-126	22	0.0005	mg/L
PCBs	PCB 1221	608, 6431B, 8082/A	GW, WW	-	-	0.0005	mg/L
PCBs	PCB 1232	608, 6431B, 8082/A	GW, WW	-	-	0.0005	mg/L
PCBs	PCB 1242	608, 6431B, 8082/A	GW, WW	-	-	0.0005	mg/L
PCBs	PCB 1248	608, 6431B, 8082/A	GW, WW	-	-	0.0005	mg/L
PCBs	PCB 1254	608, 6431B, 8082/A	GW, WW	-	-	0.0005	mg/L
PCBs	PCB 1260	608, 6431B, 8082/A	GW, WW	58-128	20	0.0005	mg/L
PCBs	PCB 1016	8082/A	SS	64-120	20	0.017	mg/Kg
PCBs	PCB 1221	8082/A	SS	-	-	0.017	mg/Kg
PCBs	PCB 1232	8082/A	SS	-	-	0.017	mg/Kg
PCBs	PCB 1242	8082/A	SS	-	-	0.017	mg/Kg
PCBs	PCB 1248	8082/A	SS	-	-	0.017	mg/Kg
PCBs	PCB 1254	8082/A	SS	-	-	0.017	mg/Kg
PCBs	PCB 1260	8082/A	SS	72-130	20	0.017	mg/Kg
Pesticides	4,4-DDD	8081A/B	SS	74-114	20	0.02	mg/Kg
Pesticides	4,4-DDE	8081A/B	SS	74-115	20	0.02	mg/Kg
Pesticides	4,4-DDT	8081A/B	SS	62-124	20	0.02	mg/Kg
Pesticides	Aldrin	8081A/B	SS	69-110	20	0.02	mg/Kg
Pesticides	Alpha BHC	8081A/B	SS	68-111	20	0.02	mg/Kg
Pesticides	Beta BHC	8081A/B	SS	74-112	20	0.02	mg/Kg
Pesticides	Delta BHC	8081A/B	SS	71-110	20	0.02	mg/Kg
Pesticides	Dieldrin	8081A/B	SS	76-115	20	0.02	mg/Kg
Pesticides	Endosulfan I	8081A/B	SS	76-119	20	0.02	mg/Kg
Pesticides	Endosulfan II	8081A/B	SS	75-116	20	0.02	mg/Kg
Pesticides	Endosulfan Sulfate	8081A/B	SS	70-118	20	0.02	mg/Kg
Pesticides	Endrin	8081A/B	SS	68-115	20	0.02	mg/Kg
Pesticides	Endrin Aldehyde	8081A/B	SS	48-92	20	0.02	mg/Kg
Pesticides	Endrin Ketone	8081A/B	SS	71-112	20	0.02	mg/Kg
Pesticides	Gamma BHC	8081A/B	SS	70-112	20	0.02	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
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Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Pesticides	Heptachlor	8081A/B	SS	69-111	20	0.02	mg/Kg
Pesticides	Heptachlor Epoxide	8081A/B	SS	72-115	20	0.02	mg/Kg
Pesticides	Hexachlorobenzene	8081A/B	SS	64-111	20	0.02	mg/Kg
Pesticides	Methoxychlor	8081A/B	SS	65-123	20	0.02	mg/Kg
Pesticides	Chlordane	8081A/B	SS	-	-	0.2	mg/Kg
Pesticides	Toxaphene	8081A/B	SS	-	-	0.4	mg/Kg
Herbicides	2,4,5-T	1658, 8151A, 6640C	GW, WW	47-120	22	0.002	mg/L
Herbicides	2,4,5-TP (SILVEX)	1658, 8151A, 6640C	GW, WW	46-125	25	0.002	mg/L
Herbicides	2,4-D	1658, 8151A, 6640C	GW, WW	39-112	23	0.002	mg/L
Herbicides	2,4-DB	1658, 8151A, 6640C	GW, WW	29-133	34	0.002	mg/L
Herbicides	Dalapon	1658, 8151A, 6640C	GW, WW	34-97	35	0.002	mg/L
Herbicides	Dicamba	1658, 8151A, 6640C	GW, WW	47-119	22	0.002	mg/L
Herbicides	Dichloroprop	1658, 8151A, 6640C	GW, WW	35-110	23	0.002	mg/L
Herbicides	Dinoseb	1658, 8151A, 6640C	GW, WW	29-111	27	0.002	mg/L
Herbicides	MCPA	1658, 8151A, 6640C	GW, WW	34-120	31	0.1	mg/L
Herbicides	MCPP	1658, 8151A, 6640C	GW, WW	16-189	31	0.1	mg/L
Herbicides	2,4,5-T	8151A	SS	34-103	22	0.07	mg/Kg
Herbicides	2,4,5-TP (SILVEX)	8151A	SS	30-123	28	0.07	mg/Kg
Herbicides	2,4-D	8151A	SS	28/-98	24	0.07	mg/Kg
Herbicides	2,4-DB	8151A	SS	26-109	32	0.07	mg/Kg
Herbicides	Dalapon	8151A	SS	28-92	23	0.07	mg/Kg
Herbicides	Dicamba	8151A	SS	38-109	20	0.07	mg/Kg
Herbicides	Dichloroprop	8151A	SS	28-91	24	0.07	mg/Kg
Herbicides	Dinoseb	8151A	SS	10-61	40	0.07	mg/Kg
Herbicides	MCPA	8151A	SS	22-101	37	6.5	mg/Kg
Herbicides	MCPP	8151A	SS	13-181	31	6.5	mg/Kg
PAH	1-Methylnaphthalene	8310, 610, 6440B	GW, WW	37-89	27	0.0001	mg/L
PAH	2-Methylnaphthalene	8310, 610, 6440B	GW, WW	34-88	28	0.0001	mg/L
PAH	Acenaphthene	8310, 610, 6440B	GW, WW	45-90	24	0.0001	mg/L
PAH	Acenaphthylene	8310, 610, 6440B	GW, WW	49-93	24	0.0001	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
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Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
PAH	Anthracene	8310, 610, 6440B	GW, WW	55-101	20	0.0001	mg/L
PAH	Benzo(a)Anthracene	8310, 610, 6440B	GW, WW	65-112	20	0.0001	mg/L
PAH	Benzo(a)Pyrene	8310, 610, 6440B	GW, WW	58-105	20	0.0001	mg/L
PAH	Benzo(b)Fluoranthene	8310, 610, 6440B	GW, WW	63-103	20	0.0001	mg/L
PAH	Benzo(g,h,i)Perylene	8310, 610, 6440B	GW, WW	47-116	20	0.0001	mg/L
PAH	Benzo(k)Fluoranthene	8310, 610, 6440B	GW, WW	61-102	20	0.0001	mg/L
PAH	Chrysene	8310, 610, 6440B	GW, WW	67-106	20	0.0001	mg/L
PAH	Dibenz(a,h)Anthracene	8310, 610, 6440B	GW, WW	39-115	23	0.0001	mg/L
PAH	Fluoranthene	8310, 610, 6440B	GW, WW	69-107	20	0.0001	mg/L
PAH	Fluorene	8310, 610, 6440B	GW, WW	48-95	21	0.0001	mg/L
PAH	Indeno(1,2,3-cd)Pyrene	8310, 610, 6440B	GW, WW	59-103	20	0.0001	mg/L
PAH	Naphthalene	8310, 610, 6440B	GW, WW	33-84	29	0.0001	mg/L
PAH	Phenanthrene	8310, 610, 6440B	GW, WW	58-95	20	0.0001	mg/L
PAH	Pyrene	8310, 610, 6440B	GW, WW	62-108	20	0.0001	mg/L
PAH	1-Methylnaphthalene	8310	SS	33-102	25	0.02	mg/Kg
PAH	2-Methylnaphthalene	8310	SS	32-101	26	0.02	mg/Kg
PAH	Acenaphthene	8310	SS	39-102	22	0.02	mg/Kg
PAH	Acenaphthylene	8310	SS	40-104	23	0.02	mg/Kg
PAH	Anthracene	8310	SS	64-102	20	0.02	mg/Kg
PAH	Benzo(a)Anthracene	8310	SS	79-100	20	0.02	mg/Kg
PAH	Benzo(a)Pyrene	8310	SS	66-109	20	0.02	mg/Kg
PAH	Benzo(b)Fluoranthene	8310	SS	79-109	20	0.02	mg/Kg
PAH	Benzo(g,h,i)Perylene	8310	SS	75-113	20	0.02	mg/Kg
PAH	Benzo(k)Fluoranthene	8310	SS	75-103	20	0.02	mg/Kg
PAH	Chrysene	8310	SS	79-109	20	0.02	mg/Kg
PAH	Dibenz(a,h)Anthracene	8310	SS	75-105	20	0.02	mg/Kg
PAH	Fluoranthene	8310	SS	80-110	20	0.02	mg/Kg
PAH	Fluorene	8310	SS	48-109	20	0.02	mg/Kg
PAH	Indeno(1,2,3-cd)Pyrene	8310	SS	75-104	20	0.02	mg/Kg
PAH	Naphthalene	8310	SS	28-99	28	0.02	mg/Kg
PAH	Phenanthrene	8310	SS	61-101	20	0.02	mg/Kg
PAH	Pyrene	8310	SS	75-104	20	0.02	mg/Kg
BNA	PYRIDINE	8270C/D 625	GW,WW	11-52	36	0.01	mg/L
BNA	PYRENE	8270C/D 625	GW,WW	65-116	*20*	0.001	mg/L
BNA	PHENOL	8270C/D 625	GW,WW	10-53	*20*	0.01	mg/L
BNA	PHENANTHRENE	8270C/D 625	GW,WW	61-110	*20*	0.001	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
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Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	PENTACHLOROPHENOL	8270C/D 625	GW,WW	10-101	*40*	0.01	mg/L
BNA	N-OCTADECANE	8270C/D 625	GW,WW	27-136	*20*	0.01	mg/L
BNA	N-NITROSODIPHENYLAMINE	8270C/D 625	GW,WW	55-98	*20*	0.01	mg/L
BNA	N-NITRODIPHENYLAMINE	8270C/D 625	GW,WW	10-186	*20*	0.01	mg/L
BNA	N-NITROSODI-N-PROPYLAMINE	8270C/D 625	GW,WW	50-115	*20*	0.01	mg/L
BNA	N-NITROSODIMETHYLAMINE	8270C/D 625	GW,WW	12-68	31	0.01	mg/L
BNA	NITROBENZENE	8270C/D 625	GW,WW	39-102	*20*	0.01	mg/L
BNA	N-DECANE	8270C/D 625	GW,WW	10-96	27	0.01	mg/L
BNA	NAPHTHALENE	8270C/D 625	GW,WW	42-103	*20*	0.001	mg/L
BNA	ISOPHORONE	8270C/D 625	GW,WW	55-108	*20*	0.01	mg/L
BNA	INDENO(1,2,3-CD)PYRENE	8270C/D 625	GW,WW	56-129	*20*	0.01	mg/L
BNA	HEXACHLOROETHANE	8270C/D 625	GW,WW	24-93	25	0.01	mg/L
BNA	HEXACHLOROCYCLOPENTADIENE	8270C/D 625	GW,WW	20-121	27	0.00	mg/L
BNA	HEXACHLOROBENZENE	8270C/D 625	GW,WW	55-117	*20*	0.001	mg/L
BNA	HEXACHLORO-1,3-BUTADIENE	8270C/D 625	GW,WW	34-115	*22*	0.01	mg/L
BNA	FLUORENE	8270C/D 625	GW,WW	58-110	*20*	0.001	mg/L
BNA	FLUORANTHENE	8270C/D 625	GW,WW	66-120	*20*	0.001	mg/L
BNA	DI-N-OCTYL PHTHALATE	8270C/D 625	GW,WW	59-143	*20*	0.003	mg/L
BNA	DI-N-BUTYL PHTHALATE	8270C/D 625	GW,WW	56-133	*20*	0.003	mg/L
BNA	DIMETHYL PHTHALATE	8270C/D 625	GW,WW	10-152	22	0.003	mg/L
BNA	DIETHYL PHTHALATE	8270C/D 625	GW,WW	33-136	*20*	0.003	mg/L
BNA	DIBENZOFURAN	8270C/D 625	GW,WW	53-109	*20*	0.01	mg/L
BNA	DIBENZ(A,H)ANTHRACENE	8270C/D 625	GW,WW	54-130	*20*	0.001	mg/L
BNA	CHRYSENE	8270C/D 625	GW,WW	65-114	*20*	0.001	mg/L
BNA	CARBAZOLE	8270C/D 625	GW,WW	62-114	*20*	0.01	mg/L
BNA	CAPROLACTAM	8270C/D 625	GW,WW	10-30	24	0.01	mg/L
BNA	BIS(2-ETHYLHEXYL)PHTHALATE	8270C/D 625	GW,WW	61-147	*20*	0.003	mg/L
BNA	BIS(2-CHLOROISOPROPYL)ETHER	8270C/D 625	GW,WW	43-108	*20*	0.01	mg/L
BNA	BIS(2-CHLOROETHYL)ETHER	8270C/D 625	GW,WW	39-109	23	0.01	mg/L
BNA	BIS(2-CHLORETHOXY)METHANE	8270C/D 625	GW,WW	56-116	*20*	0.01	mg/L
BNA	BIPHENYL	8270C/D 625	GW,WW	48-105	*20*	0.01	mg/L
BNA	BENZYLBUTYL PHTHALATE	8270C/D 625	GW,WW	12-166	*20*	0.003	mg/L
BNA	BENZYL ALCOHOL	8270C/D 625	GW,WW	32-91	*20*	0.01	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	BENZOIC ACID	8270C/D 625	GW,WW	10-62	37	0.01	mg/L
BNA	BENZO(K)FLUORANTHENE	8270C/D 625	GW,WW	62-116	*20*	0.001	mg/L
BNA	BENZO(G,H,I)PERYLENE	8270C/D 625	GW,WW	52-132	*20*	0.001	mg/L
BNA	BENZO(B)FLUORANTHENE	8270C/D 625	GW,WW	67-114	*20*	0.001	mg/L
BNA	BENZO(A)PYRENE	8270C/D 625	GW,WW	68-115	*20*	0.001	mg/L
BNA	BENZO(A)ANTHRACENE	8270C/D 625	GW,WW	68-113	*20*	0.001	mg/L
BNA	BENZIDINE	8270C/D 625	GW,WW	*10-31*	*40*	0.01	mg/L
BNA	BENZALDEHYDE	8270C/D 625	GW,WW	*10-56*	26	0.01	mg/L
BNA	AZOBENZENE	8270C/D 625	GW,WW	52-113	*20*	0.01	mg/L
BNA	ATRAZINE	8270C/D 625	GW,WW	61-116	*20*	0.01	mg/L
BNA	ANTHRACENE	8270C/D 625	GW,WW	65-114	*20*	0.001	mg/L
BNA	ANILINE	8270C/D 625	GW,WW	30-78	24	0.01	mg/L
BNA	ACETOPHENONE	8270C/D 625	GW,WW	44-98	*20*	0.01	mg/L
BNA	ACENAPHTHYLENE	8270C/D 625	GW,WW	55-119	*20*	0.001	mg/L
BNA	ACENAPHTHENE	8270C/D 625	GW,WW	52-107	*20*	0.001	mg/L
BNA	4-NITROPHENOL	8270C/D 625	GW,WW	*10-53*	*40*	0.01	mg/L
BNA	4-NITROANILINE	8270C/D 625	GW,WW	53-135	*20*	0.01	mg/L
BNA	4-CHLOROPHENYL-PHENYLETHER	8270C/D 625	GW,WW	58-115	*20*	0.01	mg/L
BNA	4-CHLOROANILINE	8270C/D 625	GW,WW	43-104	*20*	0.01	mg/L
BNA	4-CHLORO-3-METHYLPHENOL	8270C/D 625	GW,WW	50-105	*20*	0.01	mg/L
BNA	4-BROMOPHENYL-PHENYLETHER	8270C/D 625	GW,WW	63-120	*20*	0.01	mg/L
BNA	4,6-DINITRO-2-METHYLPHENOL	8270C/D 625	GW,WW	21-119	*40*	0.01	mg/L
BNA	3-NITROANILINE	8270C/D 625	GW,WW	49-116	*20*	0.01	mg/L
BNA	3,3-DICHLOROBENZIDINE	8270C/D 625	GW,WW	58-116	*20*	0.01	mg/L
BNA	3&4-METHYLPHENOL	8270C/D 625	GW,WW	33-94	*20*	0.01	mg/L
BNA	2-NITROPHENOL	8270C/D 625	GW,WW	40-112	22	0.01	mg/L
BNA	2-NITROANILINE	8270C/D 625	GW,WW	56-122	*20*	0.01	mg/L
BNA	2-METHYLPHENOL	8270C/D 625	GW,WW	35-84	*20*	0.01	mg/L
BNA	2-METHYLNAPHTHALENE	8270C/D 625	GW,WW	46-105	*20*	0.001	mg/L
BNA	2-CHLOROPHENOL	8270C/D 625	GW,WW	37-90	21	0.01	mg/L
BNA	2-CHLORONAPHTHALENE	8270C/D 625	GW,WW	47-106	*20*	0.001	mg/L
BNA	2,6-DINITROTOLUENE	8270C/D 625	GW,WW	57-110	*20*	0.01	mg/L
BNA	2,4-DINITROTOLUENE	8270C/D 625	GW,WW	59-117	*20*	0.01	mg/L
BNA	2,4-DINITROPHENOL	8270C/D 625	GW,WW	10-121	*40*	0.01	mg/L
BNA	2,4-DIMETHYLPHENOL	8270C/D 625	GW,WW	47-108	*20*	0.01	mg/L
BNA	2,4-DICHLOROPHENOL	8270C/D 625	GW,WW	46-105	*20*	0.01	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	2,4,6-TRICHLOROPHENOL	8270C/D 625	GW,WW	38-113	29	0.01	mg/L
BNA	2,4,5-TRICHLOROPHENOL	8270C/D 625	GW,WW	41-125	27	0.01	mg/L
BNA	1-METHYLNAPHTHALENE	8270C/D 625	GW,WW	45-100	*20*	0.001	mg/L
BNA	1,4-DICHLOROBENZENE	8270C/D 625	GW,WW	28-94	25	0.01	mg/L
BNA	1,3-DICHLOROBENZENE	8270C/D 625	GW,WW	27-94	25	0.01	mg/L
BNA	1,2-DICHLOROBENZENE	8270C/D 625	GW,WW	30-96	24	0.01	mg/L
BNA	1,2,4-TRICHLOROBENZENE	8270C/D 625	GW,WW	34-97	21	0.01	mg/L
BNA	1,2,4,5-TETRACHLOROBENZENE	8270C/D 625	GW,WW	40-109	*20*	0.01	mg/L
BNA	PYRIDINE	8270C/D	SS	17-79	27	0.33	mg/Kg
BNA	PYRENE	8270C/D	SS	54-104	*20*	0.33	mg/Kg
BNA	PHENOL	8270C/D	SS	49-99	*20*	0.33	mg/Kg
BNA	PHENANTHRENE	8270C/D	SS	55-103	*20*	0.33	mg/Kg
BNA	PENTACHLOROPHENOL	8270C/D	SS	*10-89*	28	0.33	mg/Kg
BNA	N-OCTADECANE	8270C/D	SS	33-122	20	0.33	mg/Kg
BNA	N-NITROSODIPHENYLAMINE	8270C/D	SS	48-90	*20*	0.33	mg/Kg
BNA	N-NITRODIPHENYLAMINE	8270C/D	SS	57-121	*20*	0.33	mg/Kg
BNA	N-NITROSODI-N-PROPYLAMINE	8270C/D	SS	52-103	*20*	0.33	mg/Kg
BNA	N-NITROSODIMETHYLAMINE	8270C/D	SS	31-107	23	0.33	mg/Kg
BNA	NITROBENZENE	8270C/D	SS	47-92	*20*	0.33	mg/Kg
BNA	N-DECANE	8270C/D	SS	31-93	21	0.33	mg/Kg
BNA	NAPHTHALENE	8270C/D	SS	55-91	*20*	0.33	mg/Kg
BNA	3&4-METHYLPHENOL	8270C/D	SS	60-104	*20*	0.33	mg/Kg
BNA	ISOPHORONE	8270C/D	SS	51-99-110	*20*	0.033	mg/Kg
BNA	INDENO(1,2,3-CD)PYRENE	8270C/D	SS	50-83	*20*	0.33	mg/Kg
BNA	HEXACHLOROETHANE	8270C/D	SS	45-117	*20*	0.033	mg/Kg
BNA	HEXACHLOROCYCLOPENTADIENE	8270C/D	SS	36-108	20	0.33	mg/Kg
BNA	HEXACHLOROBENZENE	8270C/D	SS	50-106	*20*	0.33	mg/Kg
BNA	HEXACHLORO-1,3-BUTADIENE	8270C/D	SS	53-100	*20*	0.33	mg/Kg
BNA	FLUORENE	8270C/D	SS	59-108	*20*	0.33	mg/Kg
BNA	FLUORANTHENE	8270C/D	SS	59-119	*20*	0.33	mg/Kg
BNA	DI-N-OCTYL PHTHALATE	8270C/D	SS	51-114	22	0.33	mg/Kg
BNA	DI-N-BUTYL PHTHALATE	8270C/D	SS	59-106	*20*	0.33	mg/Kg
BNA	DIMETHYL PHTHALATE	8270C/D	SS	60-105	*20*	0.33	mg/Kg
BNA	DIETHYL PHTHALATE	8270C/D	SS	61-105	*20*	0.33	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	DIBENZOFURAN	8270C/D	SS	56-98	*20*	0.33	mg/Kg
BNA	DIBENZ(A,H)ANTHRACENE	8270C/D	SS	49-111	*20*	0.33	mg/Kg
BNA	CHRYSENE	8270C/D	SS	55-102	*20*	0.33	mg/Kg
BNA	CARBAZOLE	8270C/D	SS	51-103	*20*	0.33	mg/Kg
BNA	CAPROLACTAM	8270C/D	SS	43-104	*20*	0.33	mg/Kg
BNA	BIS(2-ETHYLHEXYL)PHTHALATE	8270C/D	SS	56-120	*20*	0.33	mg/Kg
BNA	BIS(2-CHLOROISOPROPYL)ETHER	8270C/D	SS	56-95	*20*	0.33	mg/Kg
BNA	BIS(2-CHLOROETHYL)ETHER	8270C/D	SS	51-103	20	0.33	mg/Kg
BNA	BIS(2-CHLORETHOXY)METHANE	8270C/D	SS	58-104	*20*	0.33	mg/Kg
BNA	BIPHENYL	8270C/D	SS	55-93	*20*	0.33	mg/Kg
BNA	BENZYLBUTYL PHTHALATE	8270C/D	SS	61-118	*20*	0.33	mg/Kg
BNA	BENZYL ALCOHOL	8270C/D	SS	48-96	*20*	0.033	mg/Kg
BNA	BENZOIC ACID	8270C/D	SS	*10-110*	41	0.033	mg/Kg
BNA	BENZO(K)FLUORANTHENE	8270C/D	SS	53-104	*20*	0.33	mg/Kg
BNA	BENZO(G,H,I)PERYLENE	8270C/D	SS	47-112	*20*	0.33	mg/Kg
BNA	BENZO(B)FLUORANTHENE	8270C/D	SS	52-106	*20*	0.33	mg/Kg
BNA	BENZO(A)PYRENE	8270C/D	SS	57-103	*20*	0.33	mg/Kg
BNA	BENZO(A)ANTHRACENE	8270C/D	SS	56-103	*20*	0.33	mg/Kg
BNA	BENZIDINE	8270C/D	SS			0.033	mg/Kg
BNA	BENZALDEHYDE	8270C/D	SS	*10-30*	23	0.33	mg/Kg
BNA	AZOBENZENE	8270C/D	SS	49-105	*20*	0.33	mg/Kg
BNA	ATRAZINE	8270C/D	SS	55-101	*20*	0.33	mg/Kg
BNA	ANTHRACENE	8270C/D	SS	58-105	*20*	0.33	mg/Kg
BNA	ANILINE	8270C/D	SS	32-79	23	0.33	mg/Kg
BNA	ACETOPHENONE	8270C/D	SS	49-88	*20*	0.33	mg/Kg
BNA	ACENAPHTHYLENE	8270C/D	SS	61-107	*20*	0.033	mg/Kg
BNA	ACENAPHTHENE	8270C/D	SS	55-96	*20*	0.033	mg/Kg
BNA	4-NITROPHENOL	8270C/D	SS	34-101	26	0.033	mg/Kg
BNA	4-NITROANILINE	8270C/D	SS	41-105	20	0.033	mg/Kg
BNA	4-CHLOROPHENYL-PHENYLETHER	8270C/D	SS	59-103	*20*	0.033	mg/Kg
BNA	4-CHLOROANILINE	8270C/D	SS	38-89	20	0.33	mg/Kg
BNA	4-CHLORO-3-METHYLPHENOL	8270C/D	SS	58-98	*20*	0.33	mg/Kg
BNA	4-BROMOPHENYL-PHENYLETHER	8270C/D	SS	58-111	*20*	0.33	mg/Kg
BNA	4,6-DINITRO-2-	8270C/D	SS	24-98	32	0.33	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
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Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
	METHYLPHENOL						
BNA	3-NITROANILINE	8270C/D	SS	42-91	*20*	0.33	mg/Kg
BNA	3,3-DICHLOROBENZIDINE	8270C/D	SS	36-84	20	0.33	mg/Kg
BNA	2-NITROPHENOL	8270C/D	SS	55-106	*20*	0.33	mg/Kg
BNA	2-NITROANILINE	8270C/D	SS	55-110	*20*	0.33	mg/Kg
BNA	2-METHYLPHENOL	8270C/D	SS	52-90	*20*	0.33	mg/Kg
BNA	2-METHYLNAPHTHALENE	8270C/D	SS	57-94	*20*	0.033	mg/Kg
BNA	2-CHLOROPHENOL	8270C/D	SS	52-88	*20*	0.33	mg/Kg
BNA	2-CHLORONAPHTHALENE	8270C/D	SS	55-96	*20*	0.33	mg/Kg
BNA	2,6-DINITROTOLUENE	8270C/D	SS	53-99	*20*	0.33	mg/Kg
BNA	2,4-DINITROTOLUENE	8270C/D	SS	54-103	*20*	0.033	mg/Kg
BNA	2,4-DINITROPHENOL	8270C/D	SS	*10-109*	39	0.33	mg/Kg
BNA	2,4-DIMETHYLPHENOL	8270C/D	SS	52-101	*20*	0.33	mg/Kg
BNA	2,4-DICHLOROPHENOL	8270C/D	SS	56-96	*20*	0.33	mg/Kg
BNA	2,4,6-TRICHLOROPHENOL	8270C/D	SS	50-98	*20*	0.33	mg/Kg
BNA	2,4,5-TRICHLOROPHENOL	8270C/D	SS	48-103	*20*	0.33	mg/Kg
BNA	1-METHYLNAPHTHALENE	8270C/D	SS	54-90	*20*	0.33	mg/Kg
BNA	1,4-DICHLOROBENZENE	8270C/D	SS	47-84	*20*	0.33	mg/Kg
BNA	1,3-DICHLOROBENZENE	8270C/D	SS	47-84	*20*	0.33	mg/Kg
BNA	1,2-DICHLOROBENZENE	8270C/D	SS	48-86	*20*	0.33	mg/Kg
BNA	1,2,4-TRICHLOROBENZENE	8270C/D	SS	48-87	*20*	0.33	mg/Kg
BNA	1,2,4,5-TETRACHLOROBENZENE	8270C/D	SS	52-99	*20*	0.33	mg/Kg
BNA	PYRIDINE	8270C/D RV	GW,WW	*10-74*	*40*	0.01	mg/L
BNA	PYRENE	8270C/D RV	GW,WW	45-176	28	0.001	mg/L
BNA	PHENOL	8270C/D RV	GW,WW	*10-69*	*40*	0.01	mg/L
BNA	PHENANTHRENE	8270C/D RV	GW,WW	46-163	29	0.001	mg/L
BNA	PENTACHLOROPHENOL	8270C/D RV	GW,WW	*10-128*	*40*	0.01	mg/L
BNA	N-OCTADECANE	8270C/D RV	GW,WW	37-183	39	0.01	mg/L
BNA	N-NITROSODIPHENYLAMINE	8270C/D RV	GW,WW	41-168	37	0.01	mg/L
BNA	2-NITRODIPHENYLAMINE	8270C/D RV	GW,WW	39-156	38	0.01	mg/L
BNA	N-NITROSODI-N-PROPYLAMINE	8270C/D RV	GW,WW	27-157	31	0.01	mg/L
BNA	N-NITROSODIMETHYLAMINE	8270C/D RV	GW,WW	*10-96*	36	0.01	mg/L
BNA	NITROBENZENE	8270C/D RV	GW,WW	22-154	37	0.01	mg/L
BNA	N-DECANE	8270C/D RV	GW,WW	*10-141*	36	0.01	mg/L
BNA	NAPHTHALENE	8270C/D RV	GW,WW	26-147	31	0.001	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	ISOPHORONE	8270C/D RV	GW,WW	36-166	35	0.01	mg/L
BNA	INDENO(1,2,3-CD)PYRENE	8270C/D RV	GW,WW	42-184	32	0.01	mg/L
BNA	HEXACHLOROETHANE	8270C/D RV	GW,WW	*10-130*	39	0.01	mg/L
BNA	HEXACHLOROCYCLOPENTADIENE	8270C/D RV	GW,WW	*10-142*	*40*	0.00	mg/L
BNA	HEXACHLOROBENZENE	8270C/D RV	GW,WW	38-163	35	0.001	mg/L
BNA	HEXACHLORO-1,3-BUTADIENE	8270C/D RV	GW,WW	18-136	30	0.01	mg/L
BNA	FLUORENE	8270C/D RV	GW,WW	39-163	36	0.001	mg/L
BNA	FLUORANTHENE	8270C/D RV	GW,WW	46-171	37	0.001	mg/L
BNA	DI-N-OCTYL PHTHALATE	8270C/D RV	GW,WW	40-170	28	0.003	mg/L
BNA	DI-N-BUTYL PHTHALATE	8270C/D RV	GW,WW	33-175	39	0.003	mg/L
BNA	DIMETHYL PHTHALATE	8270C/D RV	GW,WW	*10-165*	37	0.003	mg/L
BNA	DIETHYL PHTHALATE	8270C/D RV	GW,WW	*10-182*	35	0.003	mg/L
BNA	DIBENZOFURAN	8270C/D RV	GW,WW	35-149	34	0.01	mg/L
BNA	DIBENZ(A,H)ANTHRACENE	8270C/D RV	GW,WW	43-187	31	0.001	mg/L
BNA	CHRYSENE	8270C/D RV	GW,WW	46-170	30	0.001	mg/L
BNA	CARBAZOLE	8270C/D RV	GW,WW	49-165	35	0.01	mg/L
BNA	CAPROLACTAM	8270C/D RV	GW,WW	*10-39*	37	0.01	mg/L
BNA	BIS(2-ETHYLHEXYL)PHTHALATE	8270C/D RV	GW,WW	42-191	33	0.003	mg/L
BNA	BIS(2-CHLOROISOPROPYL)ETHER	8270C/D RV	GW,WW	26-149	34	0.01	mg/L
BNA	BIS(2-CHLOROETHYL)ETHER	8270C/D RV	GW,WW	22-149	38	0.01	mg/L
BNA	BIS(2-CHLORETHOXY)METHANE	8270C/D RV	GW,WW	34-155	31	0.01	mg/L
BNA	BIPHENYL	8270C/D RV	GW,WW	33-151	32	0.01	mg/L
BNA	BENZYLBUTYL PHTHALATE	8270C/D RV	GW,WW	*10-178*	*40*	0.003	mg/L
BNA	BENZYL ALCOHOL	8270C/D RV	GW,WW	22-140	34	0.01	mg/L
BNA	BENZOIC ACID	8270C/D RV	GW,WW	10-75	20	0.01	mg/L
BNA	BENZO(K)FLUORANTHENE	8270C/D RV	GW,WW	42-178	33	0.001	mg/L
BNA	BENZO(G,H,I)PERYLENE	8270C/D RV	GW,WW	42-181	30	0.001	mg/L
BNA	BENZO(B)FLUORANTHENE	8270C/D RV	GW,WW	39-173	32	0.001	mg/L
BNA	BENZO(A)PYRENE	8270C/D RV	GW,WW	39-167	29	0.001	mg/L
BNA	BENZO(A)ANTHRACENE	8270C/D RV	GW,WW	46-167	29	0.001	mg/L
BNA	BENZIDINE	8270C/D RV	GW,WW	*10-86*	*40*	0.01	mg/L
BNA	BENZALDEHYDE	8270C/D RV	GW,WW	24-115	34	0.01	mg/L
BNA	AZOBENZENE	8270C/D RV	GW,WW	39-156	31	0.01	mg/L
BNA	ATRAZINE	8270C/D RV	GW,WW	50-149	38	0.01	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	ANTHRACENE	8270C/D RV	GW,WW	48-167	26	0.001	mg/L
BNA	ANILINE	8270C/D RV	GW,WW	24-120	30	0.01	mg/L
BNA	ACETOPHENONE	8270C/D RV	GW,WW	35-130	32	0.01	mg/L
BNA	ACENAPHTHYLENE	8270C/D RV	GW,WW	34-162	31	0.001	mg/L
BNA	ACENAPHTHENE	8270C/D RV	GW,WW	37-159	30	0.001	mg/L
BNA	4-NITROPHENOL	8270C/D RV	GW,WW	*10-61*	*40*	0.01	mg/L
BNA	4-NITROANILINE	8270C/D RV	GW,WW	41-174	36	0.01	mg/L
BNA	4-CHLOROPHENYL-PHENYLETHER	8270C/D RV	GW,WW	39-155	33	0.01	mg/L
BNA	4-CHLOROANILINE	8270C/D RV	GW,WW	37-158	28	0.01	mg/L
BNA	4-CHLORO-3-METHYLPHENOL	8270C/D RV	GW,WW	14-158	*40*	0.01	mg/L
BNA	4-BROMOPHENYL-PHENYLETHER	8270C/D RV	GW,WW	40-166	36	0.01	mg/L
BNA	4,6-DINITRO-2-METHYLPHENOL	8270C/D RV	GW,WW	*10-164*	*40*	0.01	mg/L
BNA	3-NITROANILINE	8270C/D RV	GW,WW	38-153	33	0.01	mg/L
BNA	3,3-DICHLOROBENZIDINE	8270C/D RV	GW,WW	42-150	29	0.01	mg/L
BNA	3&4-METHYLPHENOL	8270C/D RV	GW,WW	11-132	*40*	0.01	mg/L
BNA	2-NITROPHENOL	8270C/D RV	GW,WW	14-158	*40*	0.01	mg/L
BNA	2-NITROANILINE	8270C/D RV	GW,WW	38-169	31	0.01	mg/L
BNA	2-METHYLPHENOL	8270C/D RV	GW,WW	19-122	36	0.01	mg/L
BNA	2-METHYLNAPHTHALENE	8270C/D RV	GW,WW	27-151	32	0.001	mg/L
BNA	2-CHLOROPHENOL	8270C/D RV	GW,WW	16-129	*40*	0.01	mg/L
BNA	2-CHLORONAPHTHALENE	8270C/D RV	GW,WW	29-149	34	0.001	mg/L
BNA	2,6-DINITROTOLUENE	8270C/D RV	GW,WW	32-163	30	0.01	mg/L
BNA	2,4-DINITROTOLUENE	8270C/D RV	GW,WW	30-168	32	0.01	mg/L
BNA	2,4-DINITROPHENOL	8270C/D RV	GW,WW	*10-135*	*40*	0.01	mg/L
BNA	2,4-DIMETHYLPHENOL	8270C/D RV	GW,WW	19-160	*40*	0.01	mg/L
BNA	2,4-DICHLOROPHENOL	8270C/D RV	GW,WW	*10-157*	*40*	0.01	mg/L
BNA	2,4,6-TRICHLOROPHENOL	8270C/D RV	GW,WW	12-147	*40*	0.01	mg/L
BNA	2,4,5-TRICHLOROPHENOL	8270C/D RV	GW,WW	12-154	*40*	0.01	mg/L
BNA	2,3,4,6-TETRACHLOROPHENOL	8270C/D RV	GW,WW	10-152	*40*	0.001	mg/L
BNA	1-METHYLNAPHTHALENE	8270C/D RV	GW,WW	29-144	31	0.01	mg/L
BNA	1,4-DICHLOROBENZENE	8270C/D RV	GW,WW	15-129	34	0.01	mg/L
BNA	1,3-DICHLOROBENZENE	8270C/D RV	GW,WW	14-127	34	0.01	mg/L
BNA	1,2-DICHLOROBENZENE	8270C/D RV	GW,WW	16-134	33	0.01	mg/L
BNA	1,2,4-TRICHLOROBENZENE	8270C/D RV	GW,WW	18-130	32	0.01	mg/L
BNA	1,2,4,5-	8270C/D RV	GW,WW	29-121	31	0.01	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
	TETRACHLOROBENZENE						
BNA	Sulfolane	8270C/D	GW, WW	50-150	20	0.2	Ug/L
BNA	Sulfolane	8270C/D	SS	50-150	20	.33	Ug/kg
Glycols	Ethylene Glycol	8015	SS	80-120	20	5.0	mg/L
Glycols	Propylene Glycol	8015	SS	80-120	20	5.0	mg/L
Glycols	Ethylene Glycol	8015	GW,WW	80-120	20	5.0	mg/L
Glycols	Propylene Glycol	8015	GW,WW	80-120	20	5.0	mg/L
Explosives	1,3,5-Trinitrobenzene	8330A/B	SS	82-105	20	0.5	mg/Kg
Explosives	1,3-Dinitrobenzene	8330A/B	SS		20	0.5	mg/Kg
Explosives	2,4,6-Trinitrotoluene	8330A/B	SS	75-90	20	0.5	mg/Kg
Explosives	2,4-Dinitrotoluene	8330A/B	SS	77-101	20	0.5	mg/Kg
Explosives	2,6-Dinitrotoluene	8330A/B	SS	84-101	20	0.5	mg/Kg
Explosives	2-Nitrotoluene	8330A/B	SS	83-99	20	0.5	mg/Kg
Explosives	3-Nitrotoluene	8330A/B	SS	79-103	20	0.5	mg/Kg
Explosives	4-Nitrotoluene (4-NT)	8330A/B	SS	83-104	20	0.5	mg/Kg
Explosives	Hexahydro-1,3,5-Trinitro-1,3,5-Triazine	8330A/B	SS	81-101	20	0.5	mg/Kg
Explosives	Methyl-2,4,6-Trinitrophenylnitramine	8330A/B	SS	74-101	20	0.5	mg/Kg
Explosives	Nitrobenzene	8330A/B	SS	79-103	20	0.5	mg/Kg
Explosives	Octahydro - 1,3,5,7 -tetranitro-1,3,5,7-tetrazocine (HMX)	8330A/B	SS	86-108	20	0.0005	mg/Kg
Explosives	Pentaerythritol Tetranitrate (PETN)	8330A/B	SS	72-121	21	2	mg/Kg
Explosives	Nitroglycerine	8330A/B	SS	63-127	20	2	mg/Kg
Explosives	Nitroguanidine	8330A/B	SS		20	8	mg/Kg
Explosives	1,3,5-Trinitrobenzene	8330A/B	GW	82-105	20	0.0005	mg/L
Explosives	1,3-Dinitrobenzene	8330A/B	GW		20	0.0005	mg/L
Explosives	2,4,6-Trinitrotoluene	8330A/B	GW	75-90	20	0.0005	mg/L
Explosives	2,4-Dinitrotoluene	8330A/B	GW	77-101	20	0.0005	mg/L
Explosives	2,6-Dinitrotoluene	8330A/B	GW	84-101	20	0.0005	mg/L
Explosives	2-Nitrotoluene	8330A/B	GW	83-99	20	0.0005	mg/L
Explosives	3-Nitrotoluene	8330A/B	GW	79-103	20	0.0005	mg/L
Explosives	4-Nitrotoluene (4-NT)	8330A/B	GW	46-87	20	0.0005	mg/L
Explosives	Hexahydro-1,3,5-Trinitro-1,3,5-Triazine	8330A/B	GW	81-101	20	0.0005	mg/L
Explosives	Methyl-2,4,6-Trinitrophenylnitramine	8330A/B	GW	74-101	20	0.0005	mg/L
Explosives	Nitrobenzene	8330A/B	GW	79-103	20	0.0005	mg/L
Explosives	Octahydro - 1,3,5,7 -tetranitro-1,3,5,7-tetrazocine (HMX)	8330A/B	GW	86-108	20	0.0005	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Explosives	Pentaerythritol Tetranitrate (PETN)	8330A/B	GW	72-121	20	0.0005	mg/L
Explosives	Nitroglycerine	8330A/B	GW	67-123	20	0.0005	mg/L
GC	1, 2 Dibromoethane (EDB)	504/8011	DW,GW, WW	70 - 130	<30	0.00002	mg/L
GC	1, 2 Dibromo-3-chloropropane	504/8011	DW,GW, WW	70 - 130	<30	0.00002	mg/L
GC	1,2,3-Trichloropropane	504/8011	DW,GW, WW	70 - 130	<30	0.0005	mg/L
THAA	Bromoacetic Acid	552.2	DW	70 - 130	<30	0.001	mg/L
THAA	Chloroacetic Acid	552.2	DW	70 - 130	<30	0.002	mg/L
THAA	Dibromoacetic Acid	552.2	DW	70 - 130	<30	0.001	mg/L
THAA	Dichloroacetic Acid	552.2	DW	70 - 130	<30	0.001	mg/L
THAA	Trichloroacetic Acid	552.2	DW	70 - 130	<30	0.001	mg/L
TPH	Petroleum Range Organics (TRPH)	FL-PRO	GW,	50 - 150	<20	0.1	mg/L
TPH	Petroleum Range Organics (TRPH)	FL-PRO	SS	50 - 150	<20	4.0	mg/Kg
TPH	Petroleum Range Organics (TRPH)	EPH TN	GW	50 - 150	<20	0.1	mg/L
TPH	Petroleum Range Organics (TRPH)	EPH TN	SS	50 - 150	<20	4.0	mg/Kg
TPH	Petroleum Range Organics (TRPH) - C9-C18, C19-C36, C11-C22	MADEP EPH	GW, WW	50 - 150	<20	0.1	mg/L
TPH	Petroleum Range Organics (TRPH) - C9-C18, C19-C36, C11-C22	MADEP EPH	SS	50 - 150	<20	5.5	mg/Kg
TPH	Petroleum Range Organics (TRPH) - C10-C28	DRO, 8015Mod	GW, WW	50 - 150	<20	0.1	mg/L
TPH	Petroleum Range Organics (TRPH) - C10-C28	DRO, 8015Mod	SS	50 - 150	<20	4.0	mg/Kg
TPH	Petroleum Range Organics (TRPH) – C10-C20, C20-C34	OHIO DRO	GW, WW	50 - 150	<20	0.1	mg/L
TPH	Petroleum Range Organics (TRPH) – C10-C20, C20-C34	OHIO DRO	SS	50 - 150	<20	4.0	mg/Kg
TPH	Petroleum Range Organics (TRPH) – gas, diesel, motor oil, etc.	OA2	GW, WW	50 - 150	<20	0.1	mg/L
TPH	Petroleum Range Organics (TRPH) – gas, diesel, motor oil, etc.	OA2	SS	50 - 150	<20	4.0	mg/Kg
TPH	Petroleum Range Organics - C10-C28, C28-C40	DRORLA	GW, WW	50 - 150	<20	0.1	mg/L
TPH	Petroleum Range Organics - C10-C28, C28-C40	DRORLA	SS	50 - 150	<20	4.0	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
TPH	Petroleum Range Organics – C10-C32	DROWY	GW, WW	50 - 150	<20	0.1	mg/L
TPH	Petroleum Range Organics – C10-C32	DROWY	SS	50 - 150	<20	4.0	mg/Kg
TPH	Petroleum Range Organics – gas, diesel, motor oil, etc.	NWTPH-Dx	GW, WW	50 - 150	<20	0.25	mg/L
TPH	Petroleum Range Organics – gas, diesel, motor oil, etc.	NWTPH-Dx	SS	50 - 150	<20	25	mg/Kg
TPH	Petroleum Range Organics – C10-C28	DROWM	GW, WW	75 - 115	<20	0.1	mg/L
TPH	Petroleum Range Organics – C10-C28	DROWM	SS	70 - 120	<20	10	mg/Kg
TPH	Petroleum Range Organics – C10-C22	TPHAZ	SS	70-130	<20	30	mg/Kg
TPH	Petroleum Range Organics – C22-C32	TPHAZ	SS	70-130	<20	100.	mg/Kg
TPH	Petroleum Range Organics – C10-C32	TPHAZ	SS	70-130	<20	130.	mg/Kg
TPH	Petroleum Range Organics - C6-C12, C12-C28, C28-C35, C6-C35	TX TPH	SS	75 - 125	<20	50	mg/Kg
TPH	Petroleum Range Organics - C10-C21, C21-C35	DROMO	GW, WW	75 - 125	<20	1.0	mg/L
TPH	Petroleum Range Organics - C10-C21, C21-C35	DROMO	SS	75 - 125	<20	20	mg/Kg
IH	Aromatic Hydrocarbons	NIOSH 1501	Air	85-115	<20	10	ug/sample

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CAR is kept on file by the QA Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these limits are exceeded, corrective action must be taken. Calculated sample spike control limits are also used.

All samples and procedures are governed by ESCs quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP.

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria will take precedence.

13.2.2 Out Of Control Blanks: Applies to Method, Trip, Rinsate & Instrument Blanks

Rejection Criteria - Blank reading is more than twice the background absorbance or more than 1/2 RL.

Corrective Action - Blanks are re-analyzed and the response is assessed. Standard curves and samples are evaluated for any obvious contamination that is isolated or uniform throughout the run. If necessary, reagents are re-prepared. Analyses are not initiated until the problem is identified and solved. If samples have already been prepared or analyzed, the Department Manager or QA Department is consulted to determine if data needs to be rejected or if samples need to be re-prepared.

13.2.3 Out Of Control Laboratory Control Standards (LCS & LCSD)

Rejection Criteria - If the performance is outside of lab-generated control limits which are calculated as the mean of at least 20 data points $\pm$3 times the standard deviation of those points (Listed in Section 12) and the marginal exceedance allowance is surpassed (see section 12.2).

Corrective Action - Instrument settings are checked and the LCS standard is reanalyzed. If the LCS is still out of control, instrumentation is checked for systemic problems and repaired (if necessary). Re-calibration is performed and the samples affected since the last in control reference standard are rerun. The group leader, Department Manager, or QA Department is consulted for further action.

13.2.4 Out Of Control Matrix Spike Samples

Rejection Criteria - If sample is outside of lab-generated control limits from accuracy charts on matrix spike samples from a similar matrix (i.e., water, solid, etc). Limits are calculated as the mean of at least 20 data points $\pm$3 times the standard deviation of those points.

Corrective Action - Spiking technique is assessed to ascertain if the sample has been spiked correctly. The spiked sample should be 1 – 5 times the client sample concentration; otherwise, the percent recovery (%R) or relative percent difference (%RPD) of the MS/MSD is flagged as not meaningful or usable. The sample is re-spiked and re-analyzed,

along with several other similar samples in subset. If an out of control situation persists, sample matrix interference is indicated. Samples to be analyzed by standard additions are prepared (where appropriate), and the group leader, Department Manager, or QA Department is notified.

13.2.5 Out Of Control Duplicate Samples

Rejection Criteria - Lab-generated maximum RPD limit (as listed under precision in Section 12)

Corrective Action - Instrument and samples are checked to see if precision variance is likely (i.e., high suspended solids content, high viscosity, etc.). They are re-analyzed in duplicate and samples just before and just after the duplicated sample are re-checked. If problem still exists, Department Manager, or QA Department is notified to review the analytical techniques.

13.2.6 Out Of Control Matrix Spike Duplicates

Rejection Criteria - These QC samples can be out of control for accuracy, precision, or both.

Corrective Action - The appropriate corrective actions listed for either matrix spikes, duplicate samples, or both are followed.

NOTE: Some samples cannot be duplicated. This is the case for wipe samples, filters, and some water samples. When possible, sampling personnel should collect duplicate samples.

13.2.7 Out Of Control Calibration Standards: ICV, CCV, SSCV

Rejection Criteria - If the performance is outside of method requirements.

Corrective Action - Instrument settings are checked, calibration verification standard is reanalyzed. If the standard is still out of control, recalibration is performed, and samples affected since the last in control reference standard are rerun. The group leader, Department Manager, or QA Department will be consulted for further action.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #010103, *Document Control and Distribution*, SOP #030203, *Reagent Logs and Records* and SOP #030201, *Data Handling and Reporting*. Semi-Volatile organics calibration data are recorded and integrated using HP Enviroquant software. Calibration data from the semi-volatile analyses, in addition to the initial and daily calibration, includes GC/MS autotunes, DFTPP reports and surrogate recovery reports. Hard copy records of initial calibration and daily calibration are stored with chromatograms and integrated with sample data by date analyzed.

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 8.0.

1.0 SIGNATORY APPROVALS

Air Laboratory
QUALITY ASSURANCE MANUAL

APPENDIX VIII TO THE ESC QUALITY ASSURANCE MANUAL

for

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NOTE: The QAM has been approved by the following people. A signed cover page is available upon request

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that analytical data generated from the Air Laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the client with both routine and specialized services, field sampling and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual Version 8.0.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Kenneth W. Buckley, with a B.S. degree in General Science, is the Laboratory Operations Manager. Mr. Buckley reviews and approves all data reduction associated with analyses in these areas and is responsible for the overall production of these laboratories; including the management of the staff and scheduling. Mr. Buckley has 12 years of environmental laboratory experience. In his absence, Derek Ramey, with studies in math and engineering and 11 years of environmental laboratory experience, assumes responsibility for Air Department decisions.

5.2 TRAINING

The primary analyst or Manager trains new laboratory analysts according to ESC protocol. ESC's training program is outlined in *SOP 030205 Technical Training and Personnel Qualifications.* Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the laboratory has approximately 670 square feet of area with roughly 150 square feet of bench area. There are 670 square feet of additional storage and the lighting is fluorescence. The air system is a ten-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the US Filter deionizer system. Waste disposal containers are located in the laboratory and Clean Harbors serves as ESC's hazardous waste disposal company. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods.

ESC's laboratory safety guidelines are detailed in the *ESC Chemical Hygiene and Safety Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Samples for air analysis are collected in four ways:
  - Ø Samples may be collected directly in evacuated Summa canisters fit with the appropriately adjusted regulator that controls sampling flow to fill the canister over a given time period.
  - Ø Summa canisters may also be collected as "grab" samples by simply opening the canister without the aid of a flow regulator and allowing the canister to fill quickly by virtue of the canister vacuum.
  - Ø The third method entails collection of field samples using various sized bags specifically designed for air sampling (i.e. Tedlar). This type of sampling allows a pump connected to the bag to sample the air over the appropriate timeframe needed by the client.
  - Ø The headspace of containers housing water samples may also be analyzed for specific volatile components.

- Air samples taken in summa canisters should be shipped in bubble wrapped boxes. Tedlar bags and water samples can be shipped in a container or cooler that is sufficiently rigid and protects the samples from damage that may be incurred in shipping. The chain of custody is also placed in the container. The shipping label containing the name and address of the shipper is affixed to the outside of the cooler.
- Samples are received in the laboratory login area and are tracked using LIMS (Laboratory Information Management System). A Chain of Custody Form accompanies all samples received by the lab. This is necessary to prove the traceability of the samples and to document the change in possession from sampling to delivery to receipt by the laboratory. Prior to analysis samples are checked for integrity. Sample handling, tracking and acceptance procedures are outlined in *SOP #060105, Sample Receiving.*

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Air Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph	HP	6890N TCD	AIRGC3	1	US10726007	Air Lab
Gas Chromatograph/Mass Spectrometer	HP	6890 GC/5973MSD	AIRMS1	1	GCUS00024616 MSUS63810244	Air Lab
Gas Chromatograph/Mass Spectrometer	Agilent	6890N/5975	AIRMS2	2	CN10551083	Air Lab
Gas Chromatograph/Mass Spectrometer	Agilent	6890/5973	AIRMS3	3	US000011333 US91911078	Air Lab
Gas Chromatograph/Mass Spectrometer	Agilent	6890/5973	AIRMS4	4	US00024695 US82311265	Air Lab
Preconcentrator	Entech	7200			0197	Air Lab
Canister Autosampler	Entech	7016C			0203	Air Lab
Preconcentrator	Entech	7100A			1089	Air Lab
Preconcentrator	Entech	7200			1005	Air Lab
Canister Autosampler	Entech	7016CA			1039	Air Lab
Tedlar Autosampler	Entech	7032A-L			1019	Air Lab
Dynamic Diluter	Entech	Model 4600A			1086	Air Lab
Canister Cleaner	Entech	Model 3100A			1045	Air Lab
Canister Cleaner	Entech	Model 3100A			1178	Air Lab
Canister cleaner	Entech	Model 3100A			B33-02663	Air Lab
Preconcentrator	Entech	7100A			1137	Air Lab
Canister Autosampler	Entech	7016CA			1137	Air Lab
Tedlar Autosampler	Entech	7032A-L			1017	Air Lab

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Air Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
GC/FID	Agilent	6890N	AIRGC2	2	US10137006	Air Lab
Headspace Autosampler	Tekmar	7000			9507018	Air Lab
TO Canister	Restek/Entech	TO-Can/ SiloniteCan	1800 cans owned		N/A	Air Lab
Passive Sampling Kit	Restek		800 owned		N/A	Air Lab
Field hand held PID	RAE Systems	MiniRae2000			110-012980	Air Lab
Field hand held PID	RAE Systems	MiniRAE2000				Air Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

INSTRUMENT	*P. M. DESCRIPTION*	*FREQUENCY*
Gas Chromatograph Detectors: FID	Change Quartz jet; clean; replace flame tip	As needed - when deterioration is noticeable
Gas Chromatograph/Mass Spectrometer	•Autotune Report	Inspected daily
Gas Chromatograph/Mass Spectrometer	•Clean ion source	As needed to maintain high mass resolution
Gas Chromatograph/Mass Spectrometer	•Replace vacuum pump oil	Every 6 months
Gas Chromatographs/Mass Spectrometer & Gas Chromatographs	•Replace column	When separation begins to degrade

8.3 STANDARDS AND REAGENTS

Table 8.3A: Standard stock sources, description and calibration information.
This table is subject to revision without notice

Method	Vendor	Description	Conc.	Storage Req.	Expiration
TO-15/8260B (VAP)/Method 8-mod. ISTD Stock Standard	Spectra Gases	ISTD and Tuning Mixture	1 ppmv	3395 L (2A) cylinder	1 year
TO-15/ 8260B(VAP)/ Method 18-mod. Stock Standard*	Spectra Gases	Target Analytes except Bromoform at 3 ppmv, m&p Xylene at 2 ppmv and GRO at 40 ppmv	100 ppbv	3395 L (2A) cylinder	1 year
TO-15/ 8260B(VAP)/ Method 18-mod. Laboratory Control Stock Standard*	Spectra Gases	Target Analytes – Second Source	100 ppbv	3395 L (2A) cylinder	1 year
Landfill Gases Stock (CO_2, CO, CH_6, O_2, He)	Spectra Gases	Target Analytes	3 Levels	3395 L (2A) cylinder	1 year
Landfill Gases Laboratory Control Stock Standard	Spectra Gases	Target Analytes – Second Source	20%	3395 L (2A) cylinder	1 year
RSK-175 (Methane, Ethane, Ethene, Propane, Acetylene) Stock Standard	Scotty Gases	Target Analytes	1000 ppmv	3395 L (2A) cylinder	1 year
RSK-175 Laboratory Control Stock Standard	Scotty Gases	Target Analytes – Second Source	1000 ppmv	3395 L (2A) cylinder	1 year

TABLE 8.3B: Intermediate/Working Standard Concentrations *This table is subject to revision without notice*					
Organic Compounds	**Method #**	**Working Standard Concentrations**	**Volume of Stock Used**	**Final Volume**	**Expiration**
ISTD and Tuning Intermediate Standard	TO-15/8260B (VAP)/Method 18.	20 ppbv	900 cc	45L in 15L Canister	1 year
Target Analytes* Intermediate Standard	TO-15/8260B (VAP)/Method 18	5 ppbv except Bromoform at 5ppbv, m&p Xylene at 10 ppbv and GRO at 200 ppbv	225 cc	45L in 15L Canister	1 year
TO-15/ 8260B(VAP)/ Method 18-mod. Laboratory Control* Intermediate Standard	TO-15/8260B (VAP)/Method 18	Second Source: 5 ppbv except Bromoform at 15ppbv, m&p Xylene at 10 ppbv and GRO at 200	225 cc	45L in 15L Canister	1 year

** see analytes listed in Table 12.3.*

8.4 INSTRUMENT CALIBRATION

TO-15, 8260B(Ohio VAP Air), Gasoline Range Components (Method 18) – Volatiles in Air by GC/MS – SOP Numbers 330367, 330368, & 330369

Detector mass calibration is performed daily using the autotune function of the GC/MS analytical system and PFTBA (Perfluorotributylamine). Following verification of the appropriate masses, the instrument sensitivity is verified by injecting a tuning solution containing Bromofluorobenzene (BFB). The BFB must meet the following ion abundance criteria:

Mass	Ion Abundance Criteria
50	15.0-40.0% of mass 95
75	30.0-60.0% of mass 95
95	base peak, 100% relative abundance
96	5.0-9.0% of mass 95
173	< 2.0% of mass 174
174	> 50.0% of mass 95
175	5.0-9.0% of mass 174
176	> 95.0%, but less than 101% of mass 174
177	5.0-9.0% of mass 176

Successful tuning must occur every 24 hours for method TO-15 and Method 18 and every 12 hours for method 8260B.

Following successful tuning, the GC/MS is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of five standards. The calibration standards are tabulated according to peak height or area against concentration

and the concentrations and responses of the internal standard analytes. The results are used to determine a response factor for each analyte in each standard injected.

A TO-15 or Method 18 calibration curve is constructed and determined to be acceptable if each analyte is found to be constant over the working range (<30 % RSD with no more than 2 compounds being between 30 and 40 % RSD). When this condition is met, linearity through the origin can be assumed and the average RF can be used in place of a calibration curve.

When analyzing air by method 8260B, specific target analytes in the calibration standards are defined as calibration check compounds (CCCs) or system performance check compounds (SPCCs).

SPCCs:	
Analyte	Minimum Relative Response Factor
Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

CCCs:	
1,1-Dichloroethene	Toluene
Chloroform	Ethylbenzene
1,2-Dichloropropane	Vinyl Chloride

Analytes identified by the method as SPCCs must meet the minimum average response factors listed above for successful initial calibration. Compounds identified as CCCs must have a %RSD of less than 30% in the initial calibration curve. The remaining target analytes in the calibration standards must be <15% RSD. Initial 8260B calibration that does not meet these requirements is not accepted and re-calibration must be performed. Linear regression can be used for any target compound exceeding the 15% RSD criteria providing that the correlation coefficient is 0.990 or better.

For all methods, the initial calibration range must represent the typical air sample and include the lowest standard at or below the RL. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range. Following successful calibration, the analysis of field and QC samples may begin. Analysis may be performed only during the timeframe of a valid tuning cycle (12 hours for 8260B and 24 hours for TO-15 and Method 18). Following the expiration of the tuning clock, the instrument must be retuned and either recalibrated or the existing calibration may be verified prior to further sample analysis.

For 8260B analyses, daily continuing calibration verification (CCV) includes successful demonstration of BFB sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest, the CCC, and SPCC compounds. The BFB tune must meet the ion abundance criteria (see table above). Each SPCC in the calibration verification standard must meet a minimum response factors listed above. The CCCs must achieve the criteria of +/- 20% RSD. Each internal standard in the CCV must recover between -50% to + 100%, when compared to the same internal standard compound in the mid-point standard of the initial calibration curve. Additionally, if the retention time of an internal standard changes by more than 30 seconds from the retention time of the same internal standard in the mid-level standard of the most recent initial calibration, the system must be evaluated, corrected, and possibly re-calibrated.

For TO-15 and Method 18 analyses, daily calibration verification is accomplished by a successful demonstration of BFB sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest. The BFB tune must meet the same ion abundance criteria as previously listed and the CCV standard must recover within 30% of predicted response for all analytes of interest.

Fixed Gases (Carbon Dioxide, Carbon Monoxide, Methane, Oxygen) – SOP Number 330372

Optimize the conditions of the Gas Chromatograph with Thermal Conductivity Detection according to the manufacturer's specification to provide good resolution and sensitivity. Verify that the gas flows and column and detector temperatures are at optimum levels for analysis, based on peak resolution and chromatograph performance. Allow sufficient time between each temperature adjustment to attain a stable reading (typically one hour). Standards are injected at a minimum of three concentration levels from purchased certified standards. Generation of the initial calibration is performed using PC-based D.01 ChemStation software and a calibration factor or linear regression model. The calibration must meet 15% RSD or a correlation coefficient must be at least 0.990. Instrument calibration must be verified initially on days when a full calibration curve is not analyzed, following every 10 injections during the analytical sequence, and at the end of each sequence by the analysis of a check standard. These standards must recover within 15% of the expected concentration.

Methane, Ethane, Ethene, Propane, Acetylene based on RSK-175 – SOP Number 330370

Optimize the conditions of the Gas Chromatograph with Thermal Conductivity Detection according to the manufacturer's specification to provide good resolution and sensitivity. Verify that the gas flows and column and detector temperatures are at optimum levels for analysis, based on peak resolution and chromatograph performance. Allow sufficient time between each temperature adjustment to attain a stable reading (typically one hour). Standards are injected at a minimum of three concentration levels. The target analytes in the calibration standards must be <15% RSD. Linear regression can be used for any

target compound exceeding the 15% RSD criteria providing that the correlation coefficient is 0.990 or better. Headspace is created in each field sample by forcing 20cc of helium into each sample vial. Following sufficient time for the sample and headspace to reach equilibrium, 100 uL of air is removed from each vial and injected into the GC. Instrument calibration must be verified initially on days when a full calibration curve is not analyzed, following every 10 injections during the analytical sequence, and at the end of each sequence by the analysis of a check standard. These standards must recover within 15% of the expected concentration.

8.5 ACCEPTANCE/REJECTION OF CALIBRATION

The initial calibration curve is compared with previous curves for the same analyte. All new standard curves are immediately checked with a secondary source or laboratory control standard prepared from a separate source than those used for calibration. All curves are visually reviewed to ensure that acceptable correlation represents linearity. Calibration curves may be rejected for nonlinearity, abnormal sensitivity, or poor response of the laboratory control standard.

Continuing calibration verification is performed on each day that initial calibration is not performed and following every tenth sample. If a check standard does not perform within established criteria then the instrument will undergo evaluation to determine the problem. Once the problem is corrected, all samples between the last in control sample and the first out of control check will be re-analyzed.

TABLE 8.5: INSTRUMENT CALIBRATION & QC

Analysis/ Instrument	Calibration Type	Number of Standards	Acceptance/ Rejection Criteria	Frequency
TO-15 & Method 18/ GC/MS	Initial/ Continuing	1 - Tuning Solution	Mass m/z Abundance Criteria 50 8-40% of mass 95 75 30-66% of mass 95 95 Base peak, 100% 96 5-9% of mass 95 173 <2% of mass 174 174 >50% of mass 95 175 4-9% of mass 174 176 >93% but <101% of mass 174 177 5-9% of mass 176	TO-15/ M-18: Every 24 hours 8260 VAP: Every 12 hours
TO-15 & Method 18/ GC/MS	Initial	5 minimum	Average Response Factor: <30 % RSD with no more than 2 compounds being between 30 and 40 % RSD	As needed
8260B VAP/ GC/MS	Initial	5	Average Response Factor: Target analytes in the calibration standards must be <15% RSD, CCCs must have a %RSD of less than 30% & SPCCs must meet the minimum	As needed

TABLE 8.5: INSTRUMENT CALIBRATION & QC

Analysis/ Instrument	Calibration Type	Number of Standards	Acceptance/ Rejection Criteria	Frequency
			average response factors. Linear regression can be used for any target compound exceeding the 15% RSD	
TO-15 & Method 18/ GC/MS	Continuing	1 cal. check verification (CCV)	Percent Difference for all compounds <30%	Daily, when init. calibration is not required.
TO-15 VAP/ GC/MS	Continuing	1 cal. check verification (CCV)	Average Response Factor: Target analytes in the calibration standards must be <15% RSD, CCCs must have a %RSD of less than 20% & SPCCs must meet the minimum average response factors.	Daily, when init. calibration is not required.
TO-15 & Method 18	Initial/ Continuing	1 - Blank	< ½ RL, concentrations of common laboratory contaminants shall not exceed the reporting limit	Following init. calibration or daily cal. verification
TO-15 & Method 18	Initial/ Continuing	2 – Second source (LCS/LCSD)	Must be within +/-30% with an RPD of <25.	Following initial calibration or daily cal. Verification
Landfill Gas	Initial	3	Average Response Factor: Target analytes in the calibration standards must be <15% RSD. Linear regression can be used for any target compound exceeding the 15% RSD	As needed
Landfill Gas	Continuing	1 - cal. check verification (CCV)	Target analytes in the calibration standards must be <15% RSD.	Daily, when init. calibration is not required, following every 10th injection, and the end of the sequence.
Landfill Gas	Initial/ Continuing	1 - Blank	< ½ RL, concentrations of common laboratory contaminants shall not exceed the reporting limit	Following init. calibration or daily cal. verification
Landfill Gas	Initial/ Continuing	2 – Second source (LCS/LCSD)	Must be within +/-30% with an RPD of <25.	Following initial calibration or daily cal. verification
RSK-175	Initial	3	Average Response Factor: Target analytes in the calibration standards must be <15% RSD. Linear regression can be used for any target compound exceeding the 15% RSD	As needed
RSK-175	Continuing	1 - cal. check verification (CCV)	Target analytes in the calibration standards must be <15% RSD.	Daily, when init. calibration is not required, following every 10th injection, and the end of the sequence.
RSK-175	Initial/ Continuing	1 - Blank	< ½ RL, concentrations of common laboratory contaminants shall not exceed the reporting limit	Following init. calibration or daily cal. verification
RSK-175	Initial/	2 – Second source	Must be within +/-30% with an RPD of <25.	Following initial

TABLE 8.5: INSTRUMENT CALIBRATION & QC				
Analysis/ Instrument	**Calibration Type**	**Number of Standards**	**Acceptance/ Rejection Criteria**	**Frequency**
	Continuing	(LCS/LCSD)		calibration or daily cal. verification

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent Grade water –Type II used in the Microbiology Laboratory is periodically checked for contamination. Type II water is checked annually for single and total heavy metals. Monthly checks for total organic carbon, ammonia and organic nitrogen, total residual chlorine and a heterotrophic plate count are also conducted. Conductivity and pH are checked continuously or with each use.

9.2 SAMPLER CLEANING AND CERTIFICATION PROCEDURE

Canisters are cleaned in the laboratory using the Entech 3100 4-Position Canister Cleaner. Canisters are cleaned in batches of 4 to 8 per cleaning cycle. Prior to cleaning, canisters are inspected for integrity, damage and visible contamination. Acceptable canisters are connected to the manifold on the Entech cleaner and the cleaning cycle is controlled using Entech SmartLab software. Programmable cleaning cycles include: light, medium and heavy-duty and the cycle selected depends on the previous use of the dirtiest canister being cleaned. The cleaner automatically performs a leak check for the canisters and the manifold prior to the initial evacuation cycle. Heating bands are placed on each canister to elevate the temperature of the metallic canister to a level that provides for efficient cleaning. The typical cleaning cycle parameters are:

	Operating temperature = 120°C
1	Initial evacuation of canister to 1000 mtorr
2	Refill canister to 20psi
3	Evacuate the canister to 50 mtorr
4	Repeat items 2 & 3 for 8 total cycles
5	Final zero air pressure in clean canister is 50 mtorr.

Following cleaning, a single canister is selected as a QC sample for the entire batch and the sample is filled with zero air or nitrogen and analyzed to verify that successful cleaning has occurred. If the analysis indicates that the batch is clean (i.e. <0.2 ppbv for target analytes and free of additional contamination), the QC sample is returned to the cleaner manifold. The entire batch is evacuated to less than 50 mtorr and clearly labeled as clean and ready for sample collection. If the QC sample indicates that canister contamination is still present, the batch may be recycled through the cleaning process until residual contamination is no longer present. If following repeated cleaning cycles,

residual contamination is still observed, canisters may be permanently removed from service and clearly identified as unusable.

Tedlar bags and vials, as used for headspace analyses, are purchased as certified pre-cleaned from approved providers.

9.3 TYPICAL ENTECH AUTOSAMPLER OPERATING PARAMETERS

These parameters are provided as an example and may be modified to improve analytical system performance or better address project needs.

Line Temp = 100°C	Module 2 Desorb = 180°C
Bulk Head 1 = 30°C	Module 2 Bake = 190°C
Bulk Head 2 = 30°C	Module 2 Desorb Time = 3.5 min
Module 1 Trap = -150°C	Module 3 Trap = -180°C
Module 1 Preheat = 20°C	Module 3 Inject = 2 min
Module 1 Desorb = 20°C	Module 3 Bake Time = 2 min
Module 1 Bake = 130°C	Module 3 Event = 3
Module 1 Bake Time = 5 min	Module 3 Wait Time = 25 min.
Module 2 Trap = -30°C	Pressure Comp Factor = 14
Module 2 Preheat = off	Loop Flush = 30 seconds

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the air laboratory can be found in the following table:

TABLE 10.1: AIR DEPARTMENT SOPs

This Table is subject to revision without notice

SOP #	Title/Description
330366	Determination of Carbon Dioxide, Carbon Monoxide, Methane, Nitrogen and Oxygen in Air Samples.
330367	Measurement of Volatile Organic Compound in Ambient Air by GC/MS (EPA TO-15)
330368	Gasoline Range Organics in Ambient Air by GC/MS – Method 18 Modified
330369	Volatile Organic Compounds in Air by GC/MS 8260B for the Ohio VAP Program (with provisions for GRO determination based on 8015B)
330370	Method for Determination of Methane, Ethane, and Ethene (Based on RSK-175)

10.2 Sample Dilutions:

Dilutions for air samples from summa canisters and Tedlar bags may take three forms depending on the level of dilution required. These dilution techniques are demonstrated below:

Autosampler Dilution:

- First, a smaller sample volume can be analyzed using the capabilities of the Entech autosampler. For example, for a standard sample volume of 400cc, if 40cc were analyzed, that would be equivalent to a 10-fold dilution.
- The smallest sample volume that can be accurately analyzed using the autosampler method is l0cc (or a 40x).

Pressurized Manual Dilution:

- Sometimes, a 40X dilution is not sufficient to bring the concentration of a target analyte within the calibration range. In those cases, the sample canister is pressurized resulting in a dilution of the target analytes present.
- The act of introducing more pure air into the canister performs a dilution.
- The canister can then be analyzed at 400cc or diluted using a lesser autosampler volume, if necessary.

Secondary Manual Dilution:

- In extreme cases, the canister may need to be diluted into a second evacuated canister.
- This is accomplished by using a gas tight syringe to remove an aliquot of sample (1-l0mL) from the initial canister then injecting it into a clean evacuated second canister.
- The second canister is then analyzed and quantified taking into account the dilution based on the amount of sample injected and the total volume of the canister utilized.

Tedlar Bag Dilutions:

§ Dilutions on Tedlar bags can be performed in much the same manner as summa canisters using either the autosampler dilution or the secondary manual dilution using a second Tedlar bag and filling it with pure air then adding an aliquot of field sample using a gas tight syringe.

11.0 QUALITY CONTROL CHECKS

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

11.1 Initial Demonstrations of Capability (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing Demonstration of Capability (CDOCs) must be updated at least annually. The associated data is filed within the department and available for review.

11.2 A Laboratory Control Sample (LCS) and LCS Duplicate are analyzed per batch of samples and must yield recoveries within 70-130% of the expected concentration for all analytes and this pair must not exceed and RPD of 25%. LCS stock standards are prepared from sources independent of the calibration standards and also serve to verify the original calibration curve.

11.3 A method preparation blank is performed per batch of samples processed. If one-half the reporting limit [RL] is exceeded, the laboratory shall evaluate whether reprocessing of the samples is necessary, based on the following criteria:

- The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparation batch or
- The blank contamination is greater than 1/10 of the specified regulatory limit.

The concentrations of common laboratory contaminants shall not exceed the reporting limit. Any samples associated with a blank that fail these criteria shall be reprocessed in a subsequent preparation batch, except when the sample analysis resulted in non-detected results for the failing analytes.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in SOP #030201, *Data Handling and Reporting.* The Quality Control Department performs the secondary review of the data package using the ESC SOP #030227, *Data Review.* The QC Reviewer verifies that the analysis has performed as required and meets method criteria, all associate data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required flags on test reports, etc.)

TABLE 12.1 Data Reduction Formulas	
PARAMETER	**FORMULA**
GC/MS – Analyte Response Factor	response of analyte primary ion {*area*} x concentration of analyte (ug/L) response of ISTD primary ion {*area*} x concentration of ISTD (ug/L) *Calculations performed by HP Enviroquant Software*
GC/MS – Sample Analyte Concentration	response of primary ion in analyte x int. std concentration. {*ppbv*} x dilution factor response factor {*area/(mg/ml)*} x initial volume-mass {*ml or g*} x int. std cal. {area} *Calculations performed by HP Enviroquant Software*

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.3 by method for current QC targets and controls and current reporting limits.

Organic Control Limits - The organic QC targets are statutory in nature; warning and control limits for organic analyses are initially set for groups of compounds based on preliminary method validation data. When additional data becomes available, the QC targets are reviewed. All QC targets are routinely re-evaluated at least annually (and updated, if necessary) against laboratory historical data to insure that the limits continue to reflect realistic, method achievable goals.

12.3 REPORTING

Reporting procedures are documented in SOP #030201, *Data Handling and Reporting.*

Table 12.3: QC Targets for Air Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Method	Matrix	Accuracy (%)	Prec. (% RPD)	RL	Unit
1,1,1-Trichloroethane	TO-15	Air	70-130	25	0.2	ppbv
1,1,2,2-Tetrachloroethane	TO-15	Air	70-130	25	0.2	ppbv
1,1,2,2-Tetrachloroethane	TO-15	Air	70-130	25	0.2	ppbv
1,1,2-Trichloroethane	TO-15	Air	70-130	25	0.2	ppbv
1,1-Dichloroethane	TO-15	Air	70-130	25	0.2	ppbv
1,1-Dichloroethene	TO-15	Air	70-130	25	0.2	ppbv
1,2,4-Trichlorobenzene	TO-15	Air	70-130	25	0.63	ppbv

Table 12.3: QC Targets for Air Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Method	Matrix	Accuracy (%)	Prec. (% RPD)	RL	Unit
1,2,4-Trimethylbenzene	TO-15	Air	70-130	25	0.2	ppbv
1,2-Dibromoethane	TO-15	Air	70-130	25	0.2	ppbv
1,2-Dichlorobenzene	TO-15	Air	70-130	25	0.2	ppbv
1,2-Dichloroethane	TO-15	Air	70-130	25	0.2	ppbv
1,2-Dichloropropane	TO-15	Air	70-130	25	0.2	ppbv
1,3,5-Trimethylbenzene	TO-15	Air	70-130	25	0.2	ppbv
1,3-Butadiene	TO-15	Air	70-130	25	0.2	ppbv
1,3-Dichlorobenzene	TO-15	Air	70-130	25	0.2	ppbv
1,4-Dichlorobenzene	TO-15	Air	70-130	25	0.2	ppbv
1,4-Dioxane	TO-15	Air	70-130	25	0.2	ppbv
1,1,1-Trichloroethane	TO-15	Air	70-130	25	0.2	ppbv
2,2,4-Trimethylpentane	TO-15	Air	70-130	25	0.2	ppbv
2-Chlorotoluene	TO-15	Air	70-130	25	0.2	ppbv
2-Propanol	TO-15	Air	70-130	25	0.2	ppbv
4-Ethyltoluene	TO-15	Air	70-130	25	0.2	ppbv
Acetone	TO-15	Air	70-130	25	1.25	ppbv
Allyl Chloride	TO-15	Air	70-130	25	0.2	ppbv
Benzene	TO-15	Air	70-130	25	0.2	ppbv
Benzyl Chloride	TO-15	Air	70-130	25	0.2	ppbv
Bromomethane	TO-15	Air	70-130	25	0.2	ppbv
Bromodichloromethane	TO-15	Air	70-130	25	0.2	ppbv
Bromoform	TO-15	Air	70-130	25	0.6	ppbv
Carbon Disulfide	TO-15	Air	70-130	25	0.2	ppbv
Carbon Tetrachloride	TO-15	Air	70-130	25	0.2	ppbv
Chlorobenzene	TO-15	Air	70-130	25	0.2	ppbv
Chloroethane	TO-15	Air	70-130	25	0.2	ppbv
Chloroform	TO-15	Air	70-130	25	0.2	ppbv
Chloromethane	TO-15	Air	70-130	25	0.2	ppbv
Cis-1,2-Dichloroethene	TO-15	Air	70-130	25	0.2	ppbv
Cis-1,3-Dichloropropene	TO-15	Air	70-130	25	0.2	ppbv
Cyclohexane	TO-15	Air	70-130	25	0.2	ppbv
Dibromochloromethane	TO-15	Air	70-130	25	0.2	ppbv
Ethanol	TO-15	Air	70-130	25	0.63	ppbv
Ethyl Acetate	TO-15	Air	70-130	25	0.2	ppbv
Ethylbenzene	TO-15	Air	70-130	25	0.2	ppbv

Table 12.3: QC Targets for Air Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Method	Matrix	Accuracy (%)	Prec. (% RPD)	RL	Unit
Freon-11	TO-15	Air	70-130	25	0.2	ppbv
Freon-12	TO-15	Air	70-130	25	0.2	ppbv
Freon-113	TO-15	Air	70-130	25	0.2	ppbv
Freon-114	TO-15	Air	70-130	25	0.2	ppbv
Gasoline Range Organics	TO-15	Air	70-130	25	50	ppbv
Heptane	TO-15	Air	70-130	25	0.2	ppbv
Hexachloro-1,3-Butadiene	TO-15	Air	70-130	25	0.63	ppbv
Hexane	TO-15	Air	70-130	25	0.2	ppbv
Isopropylbenzene	TO-15	Air	70-130	25	0.2	ppbv
M&P-Xylene	TO-15	Air	70-130	25	0.4	ppbv
Methyl Butyl Ketone	TO-15	Air	70-130	25	1.25	ppbv
Methyl Ethyl Ketone	TO-15	Air	70-130	25	1.25	ppbv
Methyl Isobutyl Ketone	TO-15	Air	70-130	25	1.25	ppbv
Methyl Methacrylate	TO-15	Air	70-130	25	0.2	ppbv
Methyl tert Butyl Ether	TO-15	Air	70-130	25	0.31	ppbv
Methylene Chloride	TO-15	Air	70-130	25	0.63	ppbv
Naphthalene	TO-15	Air	70-130	25	0.63	ppbv
N-butyl benzene	TO-15	Air	70-130	25	0.2	ppbv
N-propyl benzene	TO-15	Air	70-130	25	0.2	ppbv
o-Xylene	TO-15	Air	70-130	25	0.2	ppbv
Propene	TO-15	Air	70-130	25	0.4	ppbv
Sec-butyl benzene	TO-15	Air	70-130	25	0.2	ppbv
Styrene	TO-15	Air	70-130	25	0.2	ppbv
t-Butyl Alcohol	TO-15	Air	70-130	25	0.2	ppbv
Tert-butyl benzene	TO-15	Air	70-130	25	0.2	ppbv
Tetrachloroethylene	TO-15	Air	70-130	25	0.2	ppbv
Tetrahydrofuran	TO-15	Air	70-130	25	0.2	ppbv
Toluene	TO-15	Air	70-130	25	0.2	ppbv
Trans-1,3-Dichloropropene	TO-15	Air	70-130	25	0.2	ppbv
Trans-1,2-Dichloroethene	TO-15	Air	70-130	25	0.2	ppbv
Trichloroethylene	TO-15	Air	70-130	25	0.2	ppbv
Vinyl Acetate	TO-15	Air	70-130	25	0.2	ppbv
Vinyl Bromide	TO-15	Air	70-130	25	0.2	ppbv
Vinyl Chloride	TO-15	Air	70-130	25	0.2	ppbv
Methane	RSK-175	Air/ Headspace	70-130	25	0.01	ppmv

Table 12.3: QC Targets for Air Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Method	Matrix	Accuracy (%)	Prec. (% RPD)	RL	Unit
Ethane	RSK-175	Air/ Headspace	70-130	25	0.129	ppbmv
Ethene	RSK-175	Air/ Headspace	70-130	25	0.127	ppmv
Propane	RSK-175	Air/ Headspace	70-130	25	0.186	ppmv
Acetylene	Rsk-175	Air/ Headspace	70-130	25		ppmv
Carbon Dioxide	Method 3C	Air	70-130	25	0.50 / 200	% / ppmv
Carbon Monoxide	Method 3C	Air	70-130	25	0.50 / 200	% / ppmv
Methane	Method 3C	Air	70-130	25	0.50 / 200	% / ppmv
Nitrogen	Method 3C	Air	70-130	25	0.50 / 200	% / ppmv
Oxygen	Method 3C	Air	70-130	25	0.50 / 200	% / ppmv

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The reason for the nonconformance is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CAR is kept on file by the QA department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

All samples and procedures are governed by ESC's quality assurance program. Designated corrective actions are as follows.

All samples and procedures are governed by ESC's quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria will take precedence.

13.2.2 Calibration Verification Criteria Are Not Met.

Rejection Criteria – See Table 8.5.

Corrective Action – Instrument settings are checked. The standard is reviewed for obvious cause. The standard may require re-analysis or the instrument may require recalibration.

13.2.3 Out Of Control Blanks:

Rejection Criteria - Blank reading is more than ½ the RL.

Corrective Action - Instrument settings are checked. The Blank is re-analyzed. If the blank is still out of control, bakeout of the system is performed and the blank is re-analyzed.

13.2.4 Out Of Control Laboratory Control Standards (LCS)

Rejection Criteria - If the performance is outside of lab-generated control (Listed in Table 12.3).

Corrective Action - Instrument settings are checked. The LCS standard is re-analyzed. If the LCS is still out of control, re-calibration is performed, and samples affected since the last in control reference standard are re-analyzed.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #010103, *Document Control and Distribution*, SOP #030203, *Reagent Logs and Records* and SOP #030201, *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 8.0.

1.0 SIGNATORY APPROVALS

Aquatic Toxicity Laboratory QUALITY ASSURANCE MANUAL

APPENDIX IX TO THE ESC QUALITY ASSURANCE MANUAL

for

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that analytical data generated from the Aquatic Toxicity laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in non-conforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the client with both routine and specialized services, field sampling and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual Version 8.0.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Dr. Christabel Fernandes-Monteiro, with a Ph.D. in Applied Biology, is the Department Manager of Biology. She oversees supervision of laboratory operations in the Mold, Aquatic Toxicity, Microbiology, Protozoan and BOD laboratories. Her responsibilities include assurance of reliable data through monitoring of quality control, corroborating the analysis performed, protocol development, coordination with clients regarding sample analysis, scheduling of tests and overall production in all sections within the Biology Laboratory, including management of staff.

Shain Schmitt with a B.S. degree in Biological Sciences, is responsible for sample analysis, review and approval of all data associated with Aquatic Toxicity analysis. His responsibilities also include the coordination with clients regarding sample analysis, scheduling of testing, data reductions, interpretation and validation of Toxicity analyses. Mr. Schmitt is also involved in microbiological assessments of wastewater, sludges, and drinking water. In his absence, Brandon Etheridge assumes his responsibilities.

5.2 TRAINING

All new analysts to the laboratory will be trained by the primary analyst or Manager according to ESC protocol. ESC's training program is outlined in *SOP 350355 Technical Training and Personnel Qualification for Biology.*

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the laboratory has approximately 1440 square feet of area with roughly 280 square feet of bench area. There are 300 square feet of additional storage and the lighting is fluorescence. The air system is a five-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the Siemans Elga UltraPure deionizer system. Biohazard containers are located in the laboratory and Stericycle Waste Removal serves as ESC's biological waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods, where applicable.

ESC's laboratory safety guidelines are detailed in *the ESC Chemical Hygiene and Safety Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Samples are received in the laboratory login area and are tracked using LIMS (Laboratory Information Management System). A Chain of Custody Form accompanies all samples received by the lab. This is necessary to prove the traceability of the samples and to document the change in possession from sampling to delivery to receipt by the laboratory. Prior to analysis samples are checked for integrity. Once samples are checked to confirm integrity, the samples are logged with unique sample identification information and a label is affixed to each container. Chronic Toxicity samples are uniquely identified with "sample 1, sample 2 and sample 3". A sample custodian then transports samples to the laboratory. Sample handling and tracking procedures are outlined in *SOP 060105, Sample Receiving.*

- Requirements for sample acceptance are located in *SOP 060105, Sample Receiving.*
  At a minimum, the following physical and chemical parameters are analyzed for each sample received:

  - Ø Temperature - recorded up to twice daily.
  - Ø pH - initial and final measurements recorded
  - Ø D.O. - initial and final measurements recorded
  - Ø Specific Conductance
  - Ø Alkalinity
  - Ø Hardness
  - Ø Total Residual Chlorine
- Samples must be immediately cooled and maintained at 0-6^{o}C during shipment and prior to testing.

Residual Chlorine Treatment

§ Residual chlorine in biomonitoring samples are monitored using a pocket colorimeter and these checks are documented. Chlorine removal is not performed.

Dissolved Oxygen

§ For acute tests, samples that are $\leq$ 4.0mg/L are aerated until the sample reaches 90% saturation. For chronic tests, samples that are $\leq$ 5.0 mg/L are aerated until the sample reaches 90% saturation.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Aquatic Toxicity Lab ***This table is subject to revision without notice.***			
Item	***Manufacturer***	***Model***	***Location***
Analytical Balance	Mettler	AT261 Delta Range	Aquatic Tox Lab
Class "I" weights (2)	Troemner		Aquatic Tox Lab
Conductivity Meter	Orion	150 A+	Aquatic Tox Lab
Dissolved Oxygen Meter	YSI	Model 50	Aquatic Tox Lab
Stereoscope	Olympus	SZX-IllK100	Aquatic Tox Lab
Oven	Fisher	655F	Aquatic Tox Lab
Incubator	Thermo-Kool	Environmental chamber	Aquatic Tox Lab
Incubator	Percival Scientific	1-37 VL	Aquatic Tox Lab
Incubator	Precision Sci.	818	Aquatic Tox Lab
Incubator (2)	Precision Sci.	818	Aquatic Tox Lab
Microscope	Olympus	CHT	Aquatic Tox Lab
pH Meter	Orion	VersaStar	Aquatic Tox Lab
Refrigerator (2)	Beverage Air	E Series	Aquatic Tox Lab
Stereoscope	Olympus	SZH-ILLD	Aquatic Tox Lab
Stereoscope	Olympus	SZH-ILLD	Aquatic Tox Lab
Refrigerator	Frigidaire	FRC445GB	Aquatic Tox Lab
Refrigerator	True	T-49	Aquatic Tox Lab
Water Purifier	Siemans	Elga Purelab	Aquatic Tox Lab
Refrigerator	Fridgidaire	FRC 445GB	Aquatic Tox Lab
pH/Conductivity Benchtop meter	Thermo Scientific Orion	VSTAR 52	Aquatic Tox Lab
RDO Probe	Thermo Scientific Orion	VSTAR-RD	Aquatic Tox Lab
Oven (2)	VWR	13054	Aquatic Tox Lab
Stereoscope	Olympus	SZH-STS	Aquatic Tox Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

PREVENTATIVE MAINTENANCE FOR LABORATORY EQUIPMENT		
INSTRUMENT	***P. M. DESCRIPTION***	***FREQUENCY***
Analytical Balances	•Check with Class "I" weights	Daily-tolerance 1 gm - ±0.0001 gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	10 gm - ±0.01 gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semi-annually
Refrigerators & Incubators	•Maintenance service	As needed - determined by twice daily temperature performance checks @ least 4 hours apart
Dissolved oxygen meter	•Calibrate with each use	Daily
Dissolved oxygen meter	•Change probe membrane	Every two to four weeks
Conductivity Meter	•Check probe cables	As needed
Conductivity Meter	•Clean probe	Daily
Conductivity Meter	•Replace or replatinize probe	Poor response not corrected by above
Conductivity Meter	•Calibrate with each use	Daily (or prior to each use)
Microscope/Stereoscope	•Service/calibration of each ocular micrometer	Annually
Microscope/Stereoscope	• Clean optics and stage	Each Use
pH Meters	•Reference junction & electrode replacement	As needed
pH Meters	•Probe stored in pH standard 4	At all times when not in use
pH Meters	•Other	As described in the manufacturer's manual
pH Meters	•Calibrate with each use	Daily (or prior to each use)
Bottle top dispenser/repipettor	•Calibrate	Quarterly
Bottle top dispenser/repipettor	•Clean to prevent residue buildup	As needed
Water Purifier	Tank Exchange, UV bulb and sleeve replacement (service contract maintenance and check	As needed and annually
Water Purifier	•Replace cartridge and filter	As needed and semi-annual
RDO probe	•Replace sensor cap	Annually
RDO probe	•Clean sensor cap	As needed
RDO probe	•Other	As described in manufacturer’s manual
pH/Conductivity/DO meter	•Calibrate with each use	Daily

8.3 STANDARDS , REAGENTS AND ORGANISM CULTURES

All reagents and standards must meet the requirements listed in the analytical methods.

Table 8.3A: Stock solution sources, description and related information.
(subject to revision as needed)

Description	Vendor	Storage Req.	Expiration
Conductivity standard 100	Fisher	Ambient	1 yr
Conductivity standard 1000	Fisher	Ambient	1 yr
pH buffer 7	Fisher	Ambient	1 yr
pH buffer 10	Fisher	Ambient	1 yr
Bromothymol blue solution	Fisher	Ambient	1 yr
Potassium phosphate monobasic	Fisher	Ambient	1 yr
Magnesium chloride	JT Baker	Ambient in dessicator	1 yr
Potassium Chloride	EMD	Ambient in dessicator	1 yr
Brine shrimp eggs	Argentemia	Ambient, tightly sealed.	1 yr
Calcium sulfate	EM	Ambient in dessicator	1 yr
EDTA	Fisher	Ambient in dessicator	1 yr
Sodium thiosulfate	JT Baker	Ambient in dessicator	1 yr
pH buffer 4	Fisher	Ambient.	1yr
YCT	Made in-house	-10 to -20°C	14 days after thawing
Selenastrum capricornatum	Aq. Biosystems	1-6°C	One month from concentration date
Vitamin B12	Fisher	1-6°C	NA

TABLE 8.3B: Working Solution Descriptions and Related Information.
(subject to change)

Solution	Concentrations	Storage Requirements	Expiration
KCl stock solution	31.237g KCl to 2L of 20% DMW	1-4°C	14 days
B12 Solution	0.01125g to 1L of DI Water	1-4°C	NA

Source and ***Maintenance of in-house cultures:***

Source of Biological Organisms (subject to change):
The primary source for all fathead minnows is:
Aquatic Biosystems Inc.
2821 Remington Street
Fort Collins, CO 80525

The source for their organisms is documented on each packing slip received. ESC accepts the packing slip as documentation and verification by the supplier with regards to the taxonomic identification of the bioassay species. The packing slips for bioassay test organisms are kept on file.

The amount of food added to culture vessels will depend upon the number of organisms within a given culture. As standard procedure, *Ceriodaphnia dubia* batch cultures are fed 4.5mL of YCT and algal suspension on the day of initiation. Batches are fed daily as needed. The date, time and the amount the organisms are fed is documented. All yeast purchased is at least food grade and has passed FDA standards. All (YCT) Yeast Trout Chow is made in-house. New lots are tested for pesticides, metals, and PCBs.

Ceriodaphnia dubia, fresh batch cultures are set up on Monday, Wednesday and Friday using newly hatched neonates less than 24 hours old. In addition, a minimum of 4 brood trays are set up daily in order to guarantee organisms of the right age to use in bioassays. Condition of cultures is monitored daily and documented in the daily log. The *C. dubia* brood trays are fed daily. The *C. dubia* are transferred into fresh water daily after their first brood of neonates is born. Third generation neonates, less than 24 hours old, are used for batch cultures and brood trays. Third generation neonates, less than 24 hours old and hatched within 8 hours of each other, are used for tests. Adults are used as sources for neonates until 14 days of age.

C.dubia are taxonomically identified to species on a quarterly basis. All taxonomy information is documented and kept on file for a year.

Pimephales promelas batch cultures are cleaned as needed by siphoning off the excess food and waste from the bottom of the culture vessel and renewing the water. Cultures are aerated as needed to maintain adequate dissolved oxygen.

The water used for culturing is dilute mineral water prepared by diluting (6) 750mL bottles of Perrier to 20 Liters with deionized water and aerating for 24 hours. The physical and chemical parameters for each new tank of water prepared are recorded and should fall within the following acceptable range:

1. pH - 7.9 to 8.3 units
2. D.O. - greater than 80% saturation in mg/L
3. Specific Conductance - ~215 micromhos/cm
4. Alkalinity - 80-100 mg $CaCO_3$/L
5. Hardness - 80 to 100 mg $CaCO_3$/L
6. Total Residual Chlorine - <0.1 mg/L

Pimephales promelas are taxonomically identified to species on a quarterly basis. All taxonomy information is documented and kept on file for a year.

8.4 INSTRUMENT CALIBRATION

Lighting

All testing and culturing is maintained in incubators in which temperature is constant and the photoperiod is on a 16-hour light/8-hour dark cycle. The photoperiod is verified and documented quarterly. The light intensity must be within 50 – 100 foot candles and is verified and documented semi-annually. All incubators are monitored at least weekly for proper light intensity.

pH Meter

With each use of pH meters, calibrate the instrument according to manufacturer's instructions. The slope is documented on a daily basis. Acceptable pH slope range is 95-105%. All calibration information is documented.

Volumetric Equipment

Equipment such as filter funnels, bottles, pipettes non-Class A and other containers with graduations are calibrated once per lot prior to first use. Volumetric equipment that is not disposed of after use is calibrated on an annual basis. The error of calibration must not exceed 2.5%.

Analytical Balance

Analytical balances are checked and calibrated semi-annually by a certified technician. Calibration is checked before each use with Class I weights. Class I weights are calibrated annually.

Stereoscope

All glass surfaces are kept clean using a 3:7 mixture of alcohol and ether or a small amount of xylene. Maintenance is performed by a trained technician on an annual basis.

Conductivity Meter

With each use of conductivity meters, calibrate the instrument according to manufacturer's instructions.

Dissolved Oxygen Meter

With each use of the DO meter, calibrated according to manufacturer's instructions. The electrochemical probe membrane is changed every two to four weeks to maintain accurate readings. The RDO probe sensor cap should be cleaned regularly, and replaced once per year. The RDO probe sensor cap must be stored in a moist environment.

Test Chambers

Each test chamber is rinsed with DI water prior to introducing the test organisms.

Bottle Top Dispenser/Repipettor

Repipettors are calibrated quarterly to ensure the instrument is dispensing the correct amount. Periodic cleaning is performed to maintain the accuracy and to prevent buildup of residue.

Colorimeter Chlorine tester

The colorimeter is calibrated before each use using standards to verify the instrument is accurate.

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Deionized water or reverse-osmosis produces water free from bactericidal and inhibitory substances and shall be used in the preparation of media, solutions and buffers. The quality of the water shall be monitored for chlorine residual, specific conductance, and heterotrophic bacteria plate count monthly (when in use), when maintenance is performed on the water treatment system, or at startup after a period of disuse longer than one month.

Analysis for metals is performed quarterly and the Bacteriological Water Quality Test or Use Test (to determine presence of toxic agents or growth promoting substances) shall be performed annually. Results of these analyses shall meet the specifications of the required method and records of analyses shall be maintained for five years. (An exception to performing the Bacteriological Water Quality Test shall be given to laboratories that can supply documentation to show that their water source meets the criteria, as specified by the method, for Type I or Type II reagent water.)

9.2 pH BUFFERS/CONDUCTIVITY STANDARDS

pH buffer and conductivity standard aliquots are used only once. Reagents containers are dated upon receipt and the date opened.

9.3 SPECÖ SECONDARY STANDARDS

Standards are used for retrieval and verification of the factory calibrated colorimeter and is used to verify consistent instrument calibration.

9.4 LABORATORY CONTROL WATER

Control water (20% dilute mineral water) is prepared by diluting (6) 750mL bottles of Perrier to 20 Liters with deionized water and aerating for 12 hours. The physical and chemical parameters for each new tank of water prepared are recorded and should fall within the following acceptable range:

1. pH - 7.9 to 8.3 units
2. D.O. - greater than 80% saturation in mg/L
3. Specific Conductance - ~215 micromhos/cm
4. Alkalinity - 57 to 64 80-100 mg $CaCO_3$/L
5. Hardness - 80 to 100 mg $CaCO_3$/L
6. Total Residual Chlorine - <0.1 mg/L

Control water (10% dilute mineral water) is prepared by diluting (3) 750mL bottles of Perrier to 20 Liters with deionized water and aerating for 24 hours. The physical and chemical parameters for each new tank of water prepared are recorded and should fall within the following acceptable range:

1. pH – 6.5 to 8.5 units
2. D.O. - greater than 80% saturation in mg/L
3. Specific Conductance - ~215 micromhos/cm
4. Alkalinity - 60 to 70mg $CaCO_3$/L
5. Hardness - 30 to 50mg $CaCO_3$/L
6. Total Residual Chlorine - <0.1mg/L

A given batch of control water is not used for more than 14 days following preparation.

9.5 BRINE SHRIMP

Artemia cysts are of platinum or gold grade, certified brine shrimp eggs from ARGENT chemical Laboratories. To determine the quality of the new lots of Brine shrimp, a side-by-side comparison test is performed using the new food and the food of known acceptable quality.

9.6 YCT

YCT is prepared in the laboratory. To determine the quality of the new lots of YCT a side-by-side comparison test is performed using the new food and the food of known acceptable quality.

9.7 ALGAE

Algae is commercially prepared. Upon arrival, each batch received has an accompanying Certificate of Algae Preparation History. The certificate provides the following quality control data: date prepared, species name, inoculation date, harvest date, concentration date and cell count.

9.8 GLASSWARE WASHING, STERILIZATION PROCEDURES AND EQUIPMENT STERILITY CHECKS

Glassware washing and preparation/sterilization procedures are performed according to EPA guidelines and are outlined in *SOP 030701 Glassware Cleaning* and *SOP 350334 Sterilization, Sanitization and Residue Testing of Microbiological Glassware and Equipment*. Before use, examine and discard items with chipped edges or etched inner surfaces. Reusable glassware is cleaned using the following protocol:

- Soak for 15 minutes in hot tap water with detergent and scrub. Rinse thoroughly with tap water. Rinse thoroughly with dilute nitric acid (10%). Rinse thoroughly with deionized water. Rinse thoroughly with pesticide grade acetone. Rinse well with deionized water.
- New glassware will be cleaned according to the same procedure as listed above except the first step will be preceded by soaking overnight in 10 % HNO_3.

Inspect glassware after washing for excessive water beading and rewash, if necessary. Perform checks on pH and test for inhibitory residues on glassware and plastic ware. Use utensils and containers of borosilicate glass, stainless steel, aluminum, or other corrosion resistant material for media preparation. All biological glassware is purchased pre-sterilized. Sterilization of any auxiliary equipment is performed via autoclave.

Pipettes of all sizes are checked for sterility by drawing up non-selective media into the pipette and re-dispensing the volume back into original tube that contained the media. The tube is then incubated and monitored for growth. All results are recorded and maintained within the laboratory.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the Aquatic Toxicity laboratory can be found in the following table:

TABLE 10.1: AQUATIC TOXICITY DEPARTMENT SOPs

This Table is subject to revision without notice

SOP #	Title/Description
340312	Dissolved Oxygen Membrane Electrode Method
350301	Fathead Minnow, *Pimephales promelas*, Larval Survival and Growth Test, EPA Method 1000.0
350302	Cladoceran, *Ceriodaphnia dubia*, Chronic Survival and Reproduction Test, EPA Method 1002.0
350303	*Pimephales promelas* Acute Toxicity Testing, EPA Method 2000.0
350303NC	North Carolina *Pimephales promelas* Acute Toxicity Testing
350304	*Ceriodaphnia dubia* Acute Toxicity Testing EPA Method 2002.0
350304NC	North Carolina *Ceriodaphnia dubia* Acute Toxicity Testing
350317	WET Reference toxicant testing
350318	Mini Chronic *C. dubia* NC
350320	Acceptability Test for New Food Batches for WET Testing
350321	Pocket Colorimeter Chlorine Tester Maintenance and Calibration
350322	DO Meter Maintenance and Calibration
350323	Fluke Thermometer Operation and Maintenance
350324	Digital Light Meter Maintenance and Method of Operation
350325	pH Meter Maintenance and Calibration
350326	Thermometer Operation, Maintenance and Calibration Procedure
350327	Bottle Top Dispenser Maintenance and Method of Operation
350328	Conductivity Meter Maintenance and Calibration
350329	Taxonomic Verification/Identification of *Pimephales promelas* - Fathead Minnow
350330	Taxonomic Verification/Identification of *Ceriodaphnia dubia*
350345	Receipt and Maintenance of *Pimephalas Promelas* (Fathead Minnow)
350346	Ceriodaphnia Dubia Culture Maintenance, Food Preparation, and Food Maintenance
350356	Water Bath and Incubator Temperature Stability and Load Testing
350362	Analytical Balance Operation and Verification in the Aquatic Toxicity Microbiology Lab
350363	Total Hardness Kit Operation
350364	North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure for Ceriodaphnia dubia
350362	Analytical Balance Operation and Verification in the Aquatic Toxicity Microbiology Laboratory
350363	Total Hardness Kit Operation
350364	North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure for Ceriodaphnia Dubia
350355	Technical Training and Personnel Qualifications for Biomonitoring-Aquatic Toxicity, Mold and Microbiology

10.2 Additional information regarding Aquatic testing testing can be found in:

Method Resources: EPA/821/R-02/013, EPA/821/R-02/012

- § 7-Day Fathead Minnow (*Pimephales promelas*) Larval Survival and Growth Test; Test Method 1000.0 from "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA 821-R-02-013).
- § 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test; Test Method 1002.0 from "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA 821-R-02-013).
- § Fathead Minnow (*Pimephales promelas*) Acute Toxicity Test (24, 48 or 96 hour duration); referenced in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA 821-R-02-012, 10-02).
- § *Ceriodaphnia dubia* Acute Toxicity Test (24, 48 or 96 hour duration); referenced in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA 821-R-02-012, 10-02)

11.0 QUALITY CONTROL CHECKS

11.1 At a minimum, the following physical and chemical parameters are analyzed for each biomonitoring sample received:

- Temperature - recorded up to twice daily.
- pH - initial and final measurements recorded
- D.O. - initial and final measurements recorded
- Specific Conductance
- Alkalinity
- Hardness
- Total Residual Chlorine

11.2 FEEDING REGIME

- 7-Day Fathead Minnow Larval Survival and Growth Test - Test organisms are fed 0.15mL, per container of 10 organisms. Newly hatched brine shrimp (*Artemia*) are fed to minnow batches 2-3 times daily. Batch cultures are fed depending on organism density.
- 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test - test organisms are fed 0.15mL of Yeast, Cereal leaves, Trout chow (YCT) and 0.15mL *Selenastrum capricornutum* algal suspension once daily.
- 24 and 48 Hour Acute Toxicity Tests - organisms are fed 2-5 hours prior to introduction into sample but are not fed for the duration of the test.
- 96-Hour Acute Toxicity Tests – organisms are fed at the 48 hour renewal period.
- 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test for North Carolina - test organisms are fed .05mL of YCT/15mL test solution and .05 Selanastrum capricornutum algal concentrate once daily (1.7x10 to the 7th power cells/mL).

11.3 BATCH CULTURES

Batch cultures are identified by date set up or date received. The set-up date is recorded for each batch.

Ceriodaphnia dubia, fresh batch cultures are set up on Monday, Wednesday and Friday using newly hatched neonates less than 24 hours old. In addition, a minimum of 4 brood trays are set up daily in order to guarantee organisms of the right age to use in bioassays. Condition of cultures is monitored daily and documented in the daily log. The *C. dubia* brood trays are fed daily. The *C. dubia* are transferred into fresh water daily after their first brood of neonates is born. Third generation neonates, less than 24 hours old, are used for batch cultures and brood trays. Third generation neonates, less than 24 hours old and hatched within 8 hours of each other, are used for chronic tests. Adults are used as sources for neonates until 14 days of age.

Pimephales promelas, organisms less than 36 hours old are obtained from a commercial supplier and are used immediately for chronic bioassays. Upon receipt, temperature, conductivity, pH, alkalinity and hardness are recorded and the organisms are slowly acclimated to a temperature of 25°C. If more than 10% mortality has occurred in the batch shipment, the batch is rejected and supplier is contacted. The date of the batch culture is recorded and batches are maintained for 14 days after receipt to use in acute tests. Batch cultures are monitored and fed daily. The number of organisms used is recorded in the daily log. Lots are cleaned as needed by siphoning off the excess food and waste from the bottom of the vessel and renewing the water. Minnow lots are aerated to maintain adequate dissolved oxygen. *Pimephales promelas* lots are fed 2.5 mL of newly-hatched brine shrimp per batch, 2-3 times daily. The date, time and the amount the organisms are fed are documented.

11.4 REFERENCE TOXICANT

The reference toxicant used at ESC is potassium chloride. Acute and chronic reference toxicant tests are performed at a minimum of once monthly and upper and lower control limits have been established. In respect to FDER related samples ESC will perform acute and chronic reference toxicant tests for all in-house cultures done with each batch.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in *SOP 030201 Data Handling and Reporting.* The primary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP has been followed

- Sample preparation is correct and complete
- Analytical results are correct and complete
- QC is within criteria and complete

All calculations are performed according to the EPA methods manual. When applicable, software is used to perform statistical analysis. All formulas are chosen appropriately depending on the conditions and outcome of each individual test. Due to the complexity of each formula please see EPA/821/R-02/013 for formulas pertaining to Chronic Toxicity tests and EPA/821/R-02/012 for formulas pertaining to Acute Toxicity tests.

TABLE 12.1 Data Reduction Formulas

PARAMETER	FORMULA
IC25, NOEC, LC50, AEC	Toxcalc 5.0 Software

For chronic tests the PMSD and the % CV is calculated and reported.

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by reviewing all data entries and calculations for errors, reviewing all documentation to assure that sample information is correct, and that the tests have been performed appropriately and within the appropriate holding times. The secondary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP has been followed
- Sample preparation is correct and complete
- Analytical results are correct and complete

12.3 REPORTING

Reporting procedures are documented in *SOP 030201 Data Handling and Reporting.*

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The reason for the nonconformance will be stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CAR will be kept on file by the QA department. Corrective action procedures are documented in SOP 030208 *Corrective and Preventive Action*

13.2 Required Corrective Action

All samples and procedures are governed by ESC's quality assurance program. Designated corrective actions are as follows:

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria will take precedence.

13.2.2 Out of control acute toxicity tests.

Rejection Criteria –More than 10% mortality occurs in the control organisms within the specified time frame of the test.

Corrective Action – The test will be considered invalid and must be repeated using fresh control water and fresh sample.

13.2.3 Out of control 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test.

Rejection Criteria –If more than 10% mortality occurs in the control organisms within 96 hours or more than 20% mortality occurs in the test organisms in the 3-brood period (approx. 7 days)

Corrective Action – The test will be considered invalid and must be repeated using fresh control water and fresh sample.

13.2.4 Out of control 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test.

Rejection Criteria – If the average number of young produced in the control is less than 15 per organism

Corrective Action – The test will be considered invalid and must be repeated using fresh control water and fresh sample.

13.2.5 Out of control 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test.

Rejection Criteria – A test will be considered invalid if or less than 60% (80% for NC tests) of the original number of adult daphnia loaded do not produce three broods within an eight day maximum (7 day maximum for NC tests).

Corrective Action – The test will be considered invalid and must be repeated using fresh control water and fresh sample.

13.2.6 Out of control 7-Day *Pimephales promelas* Larval Survival and Growth Test.

Rejection Criteria –If more than 10% mortality occurs in the control organisms within 96 hours or more than 20% mortality occurs in the test organisms in 7 day period.

Corrective Action – The test will be considered invalid and must be repeated using fresh control water and fresh sample.

13.2.7 Out of control 7-Day *Pimephales promelas* Larval Survival and Growth Test.

Rejection Criteria – The average weight of the control minnows is less than 0.2500 mg.

Corrective Action – The test will be considered invalid and must be repeated using fresh control water and fresh sample.

13.2.8 Out of control Monthly Reference Toxicant:

Rejection Criteria – KCl is the reference toxicant used for acute and chronic testing for the following methods: 1000.0, 1002.0, 2000.0, and 2002.0. If reference toxicant test results fail to meet ESC in-house established criteria (± 2 standard deviations from the mean and median).

Corrective Action – The test is deemed invalid and must be repeated twice. No test will be performed using organisms that fail to meet reference toxicant criteria.

13.2.9 Out of control PMSD 7-Day *Pimephales promelas* Larval Survival and Growth Test.

Rejection Criteria – The PMSD value is greater than the upper value of 30.

Corrective Action - The test may be deemed invalid and should be repeated.

13.2.10 Out of control PMSD 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test.

Rejection Criteria – The PMSD value is greater than the upper value of 47.

Corrective Action - The test may be deemed invalid and should be repeated.

13.2.11 Out of control %CV 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test and 7-Day *Pimephales promelas* Larval Survival and Growth Test.

Rejection Criteria – The %CV value is greater than the upper value of 40%.

Corrective Action - The test is deemed invalid and must be repeated.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #010103 *Document Control and Distribution,* SOP #030203 *Reagent Logs and Records* and SOP #030201 *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 8.0.

1.0 SIGNATORY APPROVALS

Microbiology Laboratory
QUALITY ASSURANCE MANUAL

APPENDIX X TO THE ESC
QUALITY ASSURANCE MANUAL

for

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NOTE: The QAM has been approved by the following people. A signed cover page is available upon request

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Eric Johnson, B.S., Laboratory Director, 615-773-9654

Dixie Marlin, B.S., QC Manager, 615-773-9681

Christabel Fernandes-Monteiro, PhD. Microbiology Department Manager, 615-773-9683

2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that analytical data generated from the Microbiology laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in non-conforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the client with both routine and specialized services, field sampling and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual Version 8.0.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Dr. Christabel Fernandes-Monteiro, with a Ph.D. in Applied Biology, is the Department Manager of Biology. She oversees supervision of laboratory operations in the Mold, Aquatic Toxicity, Microbiology, Protozoan and BOD laboratories. Her responsibilities include assurance of reliable data through monitoring of quality control, corroborating the analysis performed, protocol development, coordination with clients regarding sample analysis, scheduling of tests and overall production in all sections within the Biology Laboratory, including management of staff.

Shain Schmitt with a B.S. degree in Biological Sciences, is responsible for sample analysis, review and approval of all data associated with Microbiological analysis. His responsibilities also include the coordination with clients regarding sample analysis, scheduling of testing, data reductions, interpretation and validation.

5.2 TRAINING

The primary analyst or Manager trains new laboratory analysts according to ESC protocol. ESC's training program is outlined in SOP #350355, *Technical Training and Personnel Qualification for Biomonitoring-Microbiology.* Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in microbiological analysis is also demonstrated by acceptable participation in the ERA proficiency testing program (PTs). Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the laboratory has approximately 1440 square feet of area with roughly 280 square feet of bench area. There are 300 square feet of additional storage and the lighting is fluorescence. The air system is a five-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the Siemans Elga UltraPure deionizer system. Biohazard containers are located in the laboratory and Stericycle Waste Removal serves as ESC's biological waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods, where applicable.

ESC's laboratory safety guidelines are detailed in *the ESC Chemical Hygiene and Safety Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Samples for bacterial analysis are collected directly into pre-sterilized high-density polyethylene (HDPE) sample containers preserved with sodium thiosulfate. The container should be kept closed until sample collection. Once the container is open, do not wash, rinse or contaminate the cap or the inside of the container. For microbiological samples, the container is filled allowing at least 1 inch of headspace per container.
- Sources for microbiological samples are surface waters, waste and drinking water, ground water and soil/sludge.
- Holding times for microbiological drinking water samples is 30 hours (except HPC which has a 6 hour holding time). Soil and sludge samples have a holding time of 24 hour and 8 hours depending on the method used. All other water samples have a 6-hour hold time (plus two hour transport time).

- Microbiological samples are shipped in a cooler lined with a heavy-duty plastic bag. Once the sample container lids are secure the samples are placed in appropriately sized polyethylene bags. The chain of custody is also placed in a plastic bag. The cooler liner is completely filled with ice and the plastic bag sealed tightly with a cable tie. The shipping label contains the name and address of the shipper and is affixed to the outside of the cooler.
- Samples are received in the laboratory login area and are tracked using LIMS (Laboratory Information Management System). A Chain of Custody Form accompanies all samples received by the lab. This is necessary to prove the traceability of the samples and to document the change in possession from sampling to delivery to receipt by the laboratory. Prior to analysis samples are checked for integrity. Sample handling, tracking and acceptance procedures are outlined in *SOP 060105, Sample Receiving.*

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Microbiological Analysis ***This table is subject to revision without notice***			
Item	***Manufacturer***	***Model***	***Location***
Analytical Balance	Mettler	AT261 Delta Range	Microbiology Lab
Class "I" weights	(2 sets) Troemner		Microbiology Lab
Conductivity Meter	Orion	150 A+	Microbiology Lab
Autoclave	Pelton and Crane	Validator 8	Microbiology Lab
Water Bath	Lindberg Blue	WB1130A	Microbiology Lab
Water Bath	Blue M	MW-1110A-1	Microbiology Lab
Oven	Fisher	655F	Microbiology Lab
Incubator	Percival Scientific	1-37 VL	Microbiology Lab
Incubator	VWR	2030 22MFG	Microbiology Lab
Quantitray Sealer	IDEXX	2X	Microbiology Lab
Incubator	Precision Sci.	818	Microbiology Lab
Colony Counter	Quebecor		Microbiology Lab
pH Meter	Beckman	pH/Temp/mV/ISE	Microbiology Lab
Refrigerator	True	T-49	Microbiology Lab
Stereoscope (2)	Olympus	SZH-ILLD	Microbiology Lab
UV light; short and long wave	UVP		Microbiology Lab
Water Bath	VWR Scientific	1295PC	Microbiology Lab
Autoclave	SterlieMax	Harvey	Microbiology Lab
Stereoscope	Olympus	SZX-ILLK100	Microbiology Lab
Water Purifier	Siemans	Elga Purelab Plus	Microbiology Lab
Oven	VWR	13054	Microbiology Lab
pH meter/Conductivity meter	Thermo Scientific Orion	VStar 52	Aquatic Tox Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

PREVENTATIVE MAINTENANCE FOR LABORATORY EQUIPMENT		
INSTRUMENT	***P. M. DESCRIPTION***	***FREQUENCY***
Analytical Balances	•Check with Class "I" weights	Daily-tolerance 1 gm - ±0.0001 gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	10 gm - ±0.01 gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semi-annually
Refrigerators, Incubators, and Water Baths	•Maintenance service	As needed - determined by twice daily temperature performance checks @ least 4 hours apart
Water Bath	•Check thermometer vs. N.B.S.	Annually
Water Bath	•Remove from service when not maintaining temperature and send off for repair or replace	As needed
Autoclave	•Check sterilization efficiency	Monthly – Geobacillus Stearothermophilus ampoule
Autoclave	•Check sterilization efficiency	With each use– Chemical Indicator Strip
Conductivity Meter	•Calibrate and clean probe	Daily
Conductivity Meter	•Replace or replatinize probe	Poor response not corrected by above
Stereoscope	• Clean optics and stage	Each Use
pH Meters	•Reference junction & electrode replacement	As needed
pH Meters	•Probe stored in 4 pH standard	At all times when not in use.
pH Meters	•Other	As described in the manufacturer's O & M manual
Autoclave	•Check timing device	Quarterly
pH meter	•Calibrate and check slope (acceptable range of 95-105 %)	Daily
Quanti-Tray Sealer	•Check sealer for leaks	Monthly
Water Purifier	•Conductivity check using a calibrated conductivity meter	Monthly
Water Purifier	•Check for TOCs, ammonia, nitrogen, TRC and heterotrophic bacteria	Monthly
Water Purifier	•Check for single and heavy total metals	Annually
Incubators and Water Baths	Perform temperature stability and load testing	Annually
Autoclave	•Check pressure (annual contract maintenance)	Annually
Stereoscope	• Clean optics and stage; microscope alignment (annual maintenance contract)	Annually

8.3 STANDARDS AND REAGENTS

All reagents and standards must meet the requirements listed in the analytical methods.

Table 8.3A: Commercially prepared agar/broth, reagent sources, and storage information. ***(subject to revision as needed)***

Agar Type	*Source*	*Storage*
M-FC Broth w/ Rosolic acid	Millipore	4 ± 2°C
mColiBlue Broth	Millipore	4 ± 2°C
A-1 Media (broth)	Hach	4 ± 2°C
mEndo Broth	Hach	4 ± 2°C
Lauryl Tryptose Broth	Hach	4 ± 2°C
Brilliant Green Lactose Broth	Hach	4 ± 2°C
EC media w/ mug broth	Hach	4 ± 2°C
HPC	Hach	4 ± 2°C
Colilert reagent powder	IDEXX	Room temp
Enterolert reagent powder	IDEXX	Room temp
Xylose Lysisne Deoxycholate Agar (XLD)	HealthLink	4 ± 2°C
Brilliant Green (BG) Agar	HealthLink	4 ± 2°C
Phosphate Buffer Solution	Weber Scientific	Room temp

All stock agar expirations are per manufacturer specification.

Table 8.3B: In-house prepared agar/broth, reagent sources, and storage information.
(subject to revision as needed)

Agar Type-Stock	*Source*	*Stock Storage*	*Stock Expiration*	*Preparation Components Media*	*Prepared Storage*	*Prepared Expiration*
Xylose Lysisne Deoxycholate Agar (XLD)	Fisher/Difco	Room Temp	As specified by Manufacturer	XLD + Water	4 ± 2°C	2 weeks
Brilliant Green (BG) Agar	Fisher/Difco	Room Temp	As specified by Manufacturer	BG + Water	4 ± 2°C	2 weeks
Plate Count Agar	Fisher/Difco	Room Temp	As specified by Manufacturer	PCA + Water	4 ± 2°C	3 months
Tryptic Soy Agar	Fisher/Difco	Room Temp	As specified by Manufacturer	TSA + Water	4 ± 2°C	3 months
Triple Sugar Iron (TSI)	Fisher/Difco	Room Temp	As specified by Manufacturer	TSI + Water	4 ± 2°C	3 months
Lysine Iron Agar (LIA)	Fisher/Difco	Room Temp	As specified by Manufacturer	LIA + Water	4 ± 2°C	3 months
Tetrathionate Broth (TTB)	Fisher/Difco	Room Temp	As specified by Manufacturer	TTB +Water + 1 drops Iodine	4 ± 2°C	24 hrs
Tryptic Soy Broth (TSB)	Fisher/Difco	Room Temp	As specified by Manufacturer	TSB + Water	4 ± 2°C	3 months
Lauryl Tryptose Broth (LTB)	Fisher/Difco	Room Temp	As specified by Manufacturer	LTB + Water	4 ± 2°C	3 months
Buffered Rinse Water	Fisher/Difco	4 ± 2°C	As specified by Manufacturer	KH_2PO_4 + $MgCl_2$+Water	Room temp.	1 year

Membrane Filters and Pads

Membrane filters and pads are purchased and certified to meet the following specifications:

- Filter diameter - 47 mm, mean pore diameter - 0.45 µm. Alternate filter and pore sizes may be used if the manufacturer provides data verifying performance equal to or better than that of 47mm-diam, 0.45-µm-pore size filter. At least 70% of filter area must be pores.
- When filters are floated on reagent water, the water diffuses uniformly through the filters in 15 s with no dry spots on the filters.
- Flow rates are at least 55 mL/min/cm2 at 25°C and a differential pressure of 93kPa.
- Filters are nontoxic, free of bacterial-growth-inhibiting or stimulating substances, and free of materials that directly or indirectly interfere with bacterial indicator systems in the media. Ink grid is nontoxic. The arithmetic mean of five counts on filters must be at least 90% of the arithmetic mean of the counts on five agar spread plates using the same sample volumes and agar media.
- Filters retain the organisms from a 100mL suspension of *Serratia marcescens* containing 1×10^3 cells.
- Water extractables in filters do not exceed 2.5% after the membrane is boiled in 100mL reagent water for 20min, dried, cooled, and brought to constant weight.
- Absorbent pad has diameter 47mm, thickness 0.8mm, and is capable of absorbing 2.0 ± 0.2mL Endo broth.
- Pads release less than 1mg total acidity calculated as $CaCO_3$ when titrated to the phenolphthalein endpoint with 0.02*N* NaOH.
- If the filter and absorbent pad are not sterile, they should not be degraded by sterilization at 121°C for 10min. Confirm sterility by absence of growth when a membrane filter is placed on a pad saturated with tryptic soy broth and incubated at 35 ± 0.5°C for 24h.

8.4 INSTRUMENT CALIBRATION

Autoclave

Prior to first use, autoclaves must be initially evaluated for performance. All initial checks must be recorded and records must be retained on file. With each use, a record of items sterilized, temperature, pressure, and time is kept for each batch processed. Operating temperature is checked and recorded at least weekly with a minimum/maximum thermometer. Performance is tested monthly with *Bacillus stearothermophilus* ampoules. Chemical strips are used with each use to verify that supplies and materials have been sterilized. Records of autoclave operations shall be maintained for every cycle. Records shall include: date, contents, maximum temperature reached, pressure, time in sterilization mode, total run time (may be recorded as time in and time out) and analyst's initials.

Quebecor Colony counter

A dark field colony counter is used to count Heterotrophic Plate Count colonies. Maintenance is performed per manufacturer's instructions.

Quanti-tray Sealer

The Quanti-tray sealer is checked monthly using 100mL of bromcresol purple, or equivalent dye. The solution is poured into a test tray, sealed, and tested for leaks.

pH Meter/Conductivity Meter

With each use, calibrate the instrument according to the manufacturer's instructions. Verify that the slope of the calibration is within the 95-105% acceptable range prior to use.

Incubators & Waterbaths

Records of temperature checks are documented twice daily at least 4 hours apart when in use. Thermometers used for temperature checks are verified at least annually. Temperature stability and load testing is performed on an annual basis.

Analytical Balances

Analytical balances are checked at least daily prior to each use with class "I" weights. Records of these verifications are maintained within the laboratory. Balances are also serviced and verified and/or calibrated by an external calibration service at least semi-annually.

Volumetric Equipment, IDEXX and Commercially Prepared Phosphate Buffer Bottles

Equipment such as filter funnels, bottles, pipettes, non-Class A glassware and other containers with graduation must be calibrated once per lot prior to the first use.

IDEXX Bottles and Quanti-trays

Prior to first use, IDEXX bottles and Quanti-trays must be checked for fluorescence using a long wave UV light.

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent Grade water –Type II used in the Microbiology Laboratory is periodically checked for contamination. Type II water is checked annually for single and total heavy metals. Monthly checks for total organic carbon, ammonia and organic nitrogen, total residual chlorine and a heterotrophic plate count are also conducted. Resistivity and pH are checked continuously or with each use. Conductivity is also checked monthly using a calibrated conductivity meter.

9.2 GLASSWARE WASHING , STERILIZATION PROCEDURES AND EQUIPMENT STERILITY CHECKS

Glassware washing and preparation/sterilization procedures are performed according to EPA guidelines and are outlined in *SOP 030701 Glassware Cleaning and SOP 350334 Sterilization, Sanitization and Residue Testing of Microbiological Glassware and Equipment.* Before use, examine and discard items with chipped edges or etched inner surfaces. Reusable glassware is cleaned using the protocol established by the EPA:

- Soak for 15 minutes in hot tap water with detergent and scrub. Rinse thoroughly with tap water. Rinse thoroughly with dilute nitric acid (10%). Rinse thoroughly with deionized water. Rinse thoroughly with pesticide grade acetone. Rinse well with deionized water.
- New glassware will be cleaned according to the same procedure as listed above except the first step will be preceded by soaking overnight in 10 % $HNO_{3.}$

Inspect glassware after washing for excessive water beading and rewash, if necessary. Perform checks on pH and test for inhibitory residues on glassware and plastic ware. Use utensils and containers of borosilicate glass, stainless steel, aluminum, or other corrosion resistant material for media preparation. All biological glassware is purchased pre-sterilized. Sterilization of any auxiliary equipment is performed via autoclave.

Pipettes of all sizes are checked for sterility by drawing up non-selective media into the pipette and re-dispensing the volume back into original tube that contained the media. The tube is then incubated and monitored for growth. All results are recorded and maintained within the laboratory.

Inoculating loops are cultured by aseptically transferring the entire tip of the loop into a tube containing non-selective media. The tube is incubated and monitored for growth. Results are maintained within the laboratory.

A sterility check is performed on each batch of dilution and rinse water prepared in the laboratory and on each batch of commercially prepared water with non-selective growth media prior to first use.

In addition, stock solutions used for preparing rinse water are checked for turbidity prior to each use. If turbid, the stock buffer is discarded or re-sterilized.

9.3 MEDIA STERILITY VERIFICATION PROCEDURES

A sterility check must be analyzed for each lot of pre-prepared media and for each lot of media prepared in the laboratory. This is done prior to the first use of the media used for membrane filtration, MPN, pour plate and chromofluorogenic methods. For media used in the pour plate analytical technique, sterility blanks of the media must be made by pouring an uninoculated plate for each run in addition to sterility and lot comparison tests being performed on each lot prior to first use. Reagents and containers used in chromofluorogenic method tests are checked for fluorescence prior to first use.
All results of the sterility and lot comparison tests are documented.

9.4 POSITIVE AND NEGATIVE CONTROLS USING PURE CULTURES

ATCC Pure Cultures

Positive culture controls demonstrate that the media can support the growth of the target organism(s), and that the media produces the specified or expected reaction to the target organism(s). All media must be tested with at least one pure culture of a known positive reaction. This must be done prior to first use of the media.

Negative culture controls demonstrate that the media does not support the growth of non-target organisms or does not demonstrate the typical positive reaction of the target organism(s). All batches of selective media in the laboratory must be analyzed with one or more known negative culture controls. This must be done prior to first use of the media.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the microbiology laboratory can be found in the following table:

TABLE 10.1: MICROBIOLOGICAL DEPARTMENT SOPs

This Table is subject to revision without notice

SOP #	Title/Description
350305	Fecal Coliform: Membrane Filter Technique
350334	HPC, Method 9215 B
350315	Fecal Coliform Determination in Biosolids: Membrane Filter Technique (SM9222D)
350316	Total Coliform
350325	PH Meter Maintenance and Calibration
350326	Thermometer Operation, Maintenance and Calibration Procedure
350328	Conductivity Meter Maintenance and Calibration
350331	Salmonella in Sludge
350332	Laboratory Maintenance of Bacteria Reference Cultures
350333	QA/QC of Microbiological Equipment and Testing Materials
350369	Sterilization, Sanitization and Residue Testing of Microbiological Glassware and Equipment
350359	Calibration and Maintenance of Autoclaves
350343	Colilert
350344	m-ColiBlue
350355	Technical Training and Personnel Qualification for Biomonitoring-Microbiology
350356	Water bath and Incubator Temperature Stability and Load Testing
350348	Enterolert

10.2 Additional information regarding microbiological testing can be found in:

- Standard Methods for the Examination of Water and Wastewater, 20th Edition, Section 9000.
  - § Heterotrophic Plate Count, SM 9215B
  - § Fecal Coliform Direct Test (A-1 Media), SM9221E
  - § Standard Total Coliform Membrane Filter Procedure, SM9222B.
  - § Fecal Coliform Membrane Filter Procedure, SM9222D.
  - § Enzyme Substrate Test, SM 9223B.
  - § Quantitative Salmonella Procedures, SM9260D.
  - § Environmental Regulations and Technology, Control of Pathogens and Vector Attraction in Sewage Sludge, Appendix F.

11.0 QUALITY CONTROL CHECKS

11.1 ESC participates in microbiological proficiency testing (PTs) by analyzing samples provided by Environmental Resource Associates (ERA). Unknowns are received and analyzed according to instructions from ERA and the standard operating procedure.

11.2 Plate count comparison between two analysts is conducted monthly. Acceptable plate count comparisons must be within 10%. Analyst deviations that are outside the 10% range are repeated. If the repeat inter-analyst count is unacceptable additional procedural training and method reviews are conducted.

11.3 Duplicate analyses are performed on 10% of samples or at least one sample per month for total and fecal coliform and *E.coli* tests. Due to the infrequent laboratory receipt of some samples, duplicate analysis is conducted per sample. If the RPD exceeds 20%, the data is qualified.

11.4 For membrane filtration analyses sterility control checks are conducted on the filter assembly at the beginning and end of each sequence and following every 10 samples analyzed. If QC blank fails, the run is rejected or qualified.

11.5 Verification of total coliform and fecal coliform colonies must be conducted monthly (10 colonies/month for wastewater). Colonies found in drinking water samples must have at least five typical sheen colonies and five atypical colonies verified.

11.6 For HPC analysis, duplicate plates are run for each dilution. A positive control and an uninoculated plate performed for each run. If the QC fails, the run is rejected and qualified, and sample re-collected.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in *SOP 030201 Data Handling and Reporting*. The primary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP has been followed
- Sample preparation is correct and complete
- Analytical results are correct and complete
- QC is within criteria and complete

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by reviewing all data entries and calculations for errors, reviewing all documentation to assure that sample information is correct, and that the tests have been performed appropriately and within the appropriate holding times. The secondary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP has been followed
- Sample preparation is correct and complete
- Analytical results are correct and complete

12.3 REPORTING

Reporting procedures are documented in *SOP 030201 Data Handling and Reporting.* Microbiological data is reported as Colony Forming Units (CFU) per unit volume, Presence/Absence, or Most Probable Number (MPN)/100mL.

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) must be completed. The reason for the nonconformance will be stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CAR will be kept on file by the QA department. Corrective action procedures are documented in SOP 030208 *Corrective and Preventive Action*

13.2 Required Corrective Action

All samples and procedures are governed by ESC's quality assurance program. Designated corrective actions are as follows:

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria will take precedence.

13.2.2 Out of control plate count comparisons between analysts.

Rejection Criteria – Comparisons must be within ±10% for monthly plate count comparisons.

Corrective Action – Duplicate counts are repeated. If repeat counts are still beyond acceptance range, procedural training and method reviews are conducted.

13.2.3 Out of control duplicate analyses for total and/or fecal coliform or *E.coli* .

Rejection Criteria – Duplicate RPDs must not exceed 20% for total and/or fecal coliform or *E.coli*.

Corrective Action – Data is qualified or the analysis is repeated. If repeat analysis is still beyond acceptance range, procedural training and method reviews are conducted.

13.2.4 Out of control QC blank for membrane filtration analysis.

Rejection Criteria – Blank analyses performed either at the beginning or end of the analytical sequence is positive.

Corrective Action – The analytical sequence may be rejected and reprocessed or qualified based on the nature of the contamination.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #010103 *Document Control and Distribution,* SOP #030203 *Reagent Logs and Records* and SOP #030201 *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 8.0.

1.0 SIGNATORY APPROVALS

Mold Laboratory
QUALITY ASSURANCE MANUAL

APPENDIX XI TO THE ESC
QUALITY ASSURANCE MANUAL

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that analytical data generated from the Mold laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the client with both routine and specialized services, field sampling and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in Section 4.0 in the *ESC Quality Assurance Manual Version 8.0.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Dr. Christabel Fernandes-Monteiro, with a Ph.D. in Applied Biology, is the Department Manager for Biology. She oversees supervision of laboratory operations in the Mold, Aquatic Toxicity, Microbiology, BOD and Protozoan laboratories. Her responsibilities include assurance of reliable data through monitoring of quality control, corroborating the analysis performed, protocol development, coordination with clients regarding sample analysis, scheduling of tests and overall production in all sections within the Biology Laboratory, including management of staff. Dr. Fernandes-Monteiro oversees the review and approval processes of all data associated with the Mold and BOD laboratory. She gained experience in Mold analytical techniques at ESC, an AIHA accredited laboratory, and obtained additional training in microscopic techniques at the McCrone Research Institute. She also reviews AIHA and EPA online training modules related to the methods being performed in the Mold and BOD Laboratory. In her absence, David Cooper assumes responsibility for departmental decisions.

David Cooper, with a BS degree in Biological Sciences, is the Primary Analyst in the Mold and BOD laboratory. He is proficient in Mold analytical methods as per AIHA guidelines. David has gained analytical experience at ESC, an AIHA accredited laboratory, and obtained additional training in Mold analysis at the McCrone Research Institute. He reviews AIHA and EPA online training modules related to the methods being performed in the Mold and BOD Laboratory.

5.2 TRAINING

All new analysts to the laboratory are trained by the Primary Analyst or Manager according to ESC protocol. ESC's training program is outlined in SOP #350355, *Technical Training and Personnel Qualification for Biomonitoring-Mold*. Performance for BOD analysis is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in mold analysis is demonstrated by acceptable participation in the AIHA proficiency testing programs (EMPAT), Round Robin analysis and daily Quality Control sample analysis. On-going acceptable capability in BOD analysis is demonstrated by acceptable participation in the WP proficiency testing program and daily Quality Control sample analyses. Documentation of analyst training, including a copy of college transcripts or degree, is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

MOLD LAB

The main area of the MOLD laboratory has approximately 532 square feet with 167 square feet of bench space. The lighting throughout the laboratory is fluorescence. The air system is a five-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the ELGA PureLab Ultra deionizer system. Biohazard containers are located in the laboratory and Commodore Waste Removal serves as ESC'S biological waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

BOD LAB

The main area of the BOD laboratory has approximately 532 square feet of area with 151 square feet of bench space. The lighting standard throughout the laboratory is fluorescence. The air system is a five-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the ELGA PureLab Ultra deionizer system. Biohazard containers are located in the laboratory and Commodore Waste Removal serves as ESC'S biological waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where infectious aerosols or splashes may occur are conducted in biological safety II cabinets.
- The following Biosafety Level 2 (BSL2) guidelines are adhered to:
  - Closed-toe shoes are worn in the laboratory
  - Floors and work surfaces are cleaned on a regular basis
  - Emergency numbers are posted in the laboratory
  - Biological safety hoods are tested and certified annually
  - Laboratory personnel are trained in the use of the biological spill kit and emergency safety equipment
- ESC's laboratory safety guidelines are detailed in the ESC *Chemical Hygiene and Safety Plan*.

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Samples are received in the laboratory login area and are tracked using LIMS (Laboratory Information Management System). A Chain of Custody Form accompanies all samples received by the lab. This is necessary to prove the traceability of the samples and to document the change in possession from sampling to delivery to receipt by the laboratory. Prior to analysis samples are checked for integrity. Sample handling, tracking and acceptance procedures are outlined in SOP #060105, *Sample Receiving.*
- Sample storage procedures are followed using guidance from each approved method and associated department SOP.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Mold/ BOD Analysis
This table is subject to revision without notice

Item	**Manufacturer**	*Model*	*Serial #*	*Location*
Analytical Balance	Mettler	PL602-S	1125081657	Bacteriology Lab
Analytical Balance	Ohaus	Adventure Pro	8029211055	Bacteriology Lab
Autoclave	Tuttnauer	2540EK	2906170	Mold Lab
Class I BSC	AirFiltronix	AirFiltronix HS 4500	41031	Mold Lab
Class II BSC	Labconco	Labconco 36213	60554894	Mold Lab

LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Mold/ BOD Analysis
This table is subject to revision without notice

Item	**Manufacturer**	*Model*	*Serial #*	*Location*
Class II BSC	Labconco	Labconco 36209	03076555	Bacteriology Lab
COD Reactor	HACH	45600	900903221	BOD
Microscope	NIKON	LABOPHOT	242008	Mold Lab
Microscope	NIKON	LABOPHOT	235267	Mold Lab
Microscope	Olympus	CH2	900216	Mold Lab
Microscope	Olympus	BH-2	708821	Mold Lab
Microscope	Leitz	Laborlux	512663	Mold Lab
Microscope	VWR Scientific	VWRC1	V167173	Mold Lab
Refrigerator	Whirlpool			Bacteriology Lab
Refrigerator	Whirlpool	El05PPXMQ	EEP3524864	Mold Lab
Refrigerator	Whirlpool	EL7ATRRMQ07	EWR4973976	Mold Lab
Refrigerator	Frigidaire	FRT17G4BW9	BA703306	Mold Lab
Stereoscope	VWR Scientific	VWRS1	V168430	Mold Lab
Incubator	Labtronix	BOD2100D	21000010213	Mold Lab
Incubator	Quincy Lab	10-100	I11-2454	Mold Lab
Incubator	Precision Scientific	30M	9303590	Bacteriology Lab
Incubator	Precision Scientific	30M		Bacteriology Lab
Incubator	VWR	2030	802202	BOD
Incubator	Fisher	Not Visible	100212	BOD
Incubator	Thermo Scientific Precision	3271	317217-1241	BOD
Incubator	Precision	818	35AK-10	BOD
Waterbath	Blue M-MagniWhirlpool	MW-1110A	14991	Bacteriology Lab
Biolog MicroStation	Biolog, Inc.	Micrologg 3	342689	Bacteriology Lab
Turbidimeter	Biolog, Inc.	21907	6093898	Bacteriology Lab
Plate Reader	Biotek	ELX808BLG	203222	Bacteriology Lab
Vortex Genie2 Mixer	VWR	G-560	2-223236	Mold Lab
Vortex Genie2 Mixer	VWR	G-560	2-223236	Bacteriology Lab
Stir Plate	Corning	PC-420D	023507102961	Bacteriology Lab
Stir Plate	Fisher	118	102	Bacteriology Lab
Stir Plate	VWR	205	7852	BOD
Stir Plate	VWR	220	5031	BOD
BOD SP Robotic Analyzer	Skalar	SP50	08124	BOD
BOD SP Robotic Analyzer	Skalar	SP50	08123	BOD
DO meter	YSI	5000	081C101451	BOD
DO meter	YSI	5000	081C101450	BOD
pH meter	VWR	Symphony B10P	12284S0009	BOD
Spectrophotometer	Hach	DR 2700	1388224	BOD

8.2 EQUIPMENT PREVENTIVE MAINTENANCE

INSTRUMENT	***P. M. DESCRIPTION***	***FREQUENCY***
Analytical Balances	•Check with Class "I" weights	Daily-tolerance 1 gm - ±0.0001gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	10 gm - ±0.01 gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semiannually
Refrigerators, Waterbaths, & Incubators	•Maintenance service	As needed - determined by daily temperature performance checks twice daily and at least 4 hours apart
Water Bath	•Check thermometer vs. NIST	Once each year
Water Bath	•Remove from service when not maintaining temperature and send off for repair or replace	As needed
Incubators and Waterbaths	Perform Temperature stability and load testing	Annually
Autoclave	•Check sterilization efficiency	Weekly – *G. stearothermophilus*
Autoclave	•Check sterilization efficiency	Per Use – Chemical Indicator
Autoclave	Check timing devices	Quarterly
Autoclave	Check pressure (annual Maintenance contract)	Annually
Class II Biosafety Cabinet	•Monitor air and UV lamps	Monthly
Class II Biosafety Cabinet	•Inspect for air flow	Quarterly
Class II Biosafety Cabinet	•Recertification according to NSF standard 49	Annually
Turbidimeter	•Maintenance Service	Annually
Turbidimeter	•Check for accuracy using NIST traceable stds	Per Use
Biolog MicroStation	•Maintenance Service	Annually
Microscope	•Service/calibration of each ocular micrometer	Annually
Microscope	•Clean optics and stage, Kohler Alignment	Each Use
pH meters	Calibrate and check slope (acceptable; range of 95-	Daily
pH meters	Reference junction & electrode replacement	As needed
pH meters	Probe stored in KCl	At all times when not in use
pH meters	Other	As described in manufacturer's O
BOD SP Robotic Analyzer	Calibrate DO probe	Daily
BOD SP Robotic Analyzer	Clean and Change DO probe membrane	Weekly
BOD SP Robotic Analyzer	Rinse ATU (seed) dispenser using rinse pump option	As needed
BOD SP Robotic Analyzer	Clean rinsing vessel	Every 3 months or as needed
BOD SP Robotic Analyzer	Replace tubing for dispenser, diluent pump, and rinsing vessel	Annually or as needed

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8.3 STANDARDS AND REAGENTS

Table 8.3A lists commercially prepared agar sources. Table 8.3 B lists in-house prepared agar sources and storage information. Table 8.3C lists standard sources, receipt, and preparation information for BOD Analysis. Table 8.3D is designed to provide general calibration range information for BOD analysis. These ranges may change depending on regulatory requirements, procedural changes, or project needs.

Table 8.3A: Commercially prepared agar sources and storage information.
(subject to revision as needed)

Agar Type	***Source***	***Storage***
Malt Extract Agar w/chloramphenicol (MEA)	HealthLink	4 ± 2°C
DG18 Agar	HealthLink	4 ± 2°C
Modified Cellulose Agar	HealthLink	4 ± 2°C
Potato Dextrose Agar w/chloramphenicol (PDA)	HealthLink	4 ± 2°C
Tryptic Soy Agar w/Sheep Blood	HealthLink	4 ± 2°C
R2A w/cycloheximide	HealthLink	4 ± 2°C
2 % Malt Extract	Biolog	4 ± 2°C
Biolog Universal Agar (BUG)	Biolog	4 ± 2°C
BUG w/BL	Biolog	4 ± 2°C
Biolog Universal Anaerobic Agar (BUA)	Biolog	4 ± 2°C
BUA w/BL	Biolog	4 ± 2°C
Biolog Universal Yeast Agar (BUY)	Biolog	4 ± 2°C
TSA w/SB contact	HealthLink	4 ± 2°C
BUG w/0.25% Maltose	Biolog	4 ± 2°C
Malt Extract Agar w/chloramphenicol contact	HealthLink	4 ± 2°C
Chocolate Agar	Biolog	4 ± 2°C
Czapek Yeast Extract Agar	HealthLink	4 ± 2°C

All stock agar expirations are per manufacturer specification.

Table 8.3B: In-house prepared agar sources and storage information.
(subject to revision as needed)

Agar Type-Stock	*Source*	*Stock Storage*	*Stock Expiration*	*Preparation Components Media*	*Prepared Storage*	*Prepared Expiration*
Malt Extract Agar (MEA)	Fisher/Difco	Room Temp	As specified by Manufacturer	MEA + Water	4 ± 2°C	3 weeks
Potato Dextrose Agar (PDA)	Fisher/Difco	Room Temp	As specified by Manufacturer	PDA + Water	4 ± 2°C	3 weeks
Modified Saboraud's Agar (MSA)	Fisher/Difco	Room Temp	As specified by Manufacturer	M-SAB Dex + Water	4 ± 2°C	3 weeks
R2A	Fisher/Difco	Room Temp	As specified by Manufacturer	R2A + Water	4 ± 2°C	3 weeks
2 % Malt Extract	Fisher/Oxoid	Room Temp	As specified by Manufacturer	Bacteriological Agar + Malt	4 ± 2°C	3 weeks
Biolog Universal Agar (BUG)	Biolog	Room Temp	As specified by Manufacturer	BUG + Water	4 ± 2°C	3 weeks
Biolog Universal Anaerobic Agar (BUA)	Biolog	Room Temp	As specified by Manufacturer	BUA + Water	4 ± 2°C	3 weeks
Biolog Universal Yeast Agar (BUY)	Biolog	Room Temp	As specified by Manufacturer	BUY + Water	4 ± 2°C	3 weeks
Biolog Universal Agar (BUG) with 0.25%	Biolog	Room Temp	As specified by Manufacturer	BUG + Water + Maltose	4 ± 2°C	3 weeks
Anaerobic Agar (ANA)	Hi Media	Room Temp	As specified by Manufacturer	ANA + water	4 ± 2°C	3 weeks

Table 8.3C: Standard sources, description and calibration information.
(This table is subject to revision without notice)

Instrument Group	*Standard Source*	*How Received*	*Source/Storage*	*Preparation from Source*	*Lab Stock Storage*	*Preparation Frequency*
BOD	Lab preparation	As dry glucose and glutamic acid	Dessicator	150mg each/L	4 ± 2°C	Made fresh daily
pH meter	Commercial source	pH 7.0 buffer	Ambient	No prep required	NA	Annual/Expiration Date
pH meter	Commercial source	pH 10.0 buffer	Ambient	No prep required	NA	Annual/Expiration Date
Turbidity meter	Commercial source	Turbidity standard	Ambient	No prep required	NA	Annual/Expiration Date

Table 8.3D: Working Standard Calibration

Analysis	*Calibration Standard*
BOD	D.O.- Barometric pressure/temp, Glucose and glutamic acid reference standard

Source of Fungi

A collection of fungi is maintained in the laboratory as training and reference material. The fungi are isolated from proficiency testing samples, laboratory contaminants and client samples, and stored as Malt Extract Agar slants for 3 months at 4 ± 2ºC. Cultures are sub-cultured every 3 months. Each culture is assigned an accession number, genus, specific epithet, authority, source, and name of collector. Records are maintained in the laboratory in the accession list database.

Source of Bacteria

A collection of bacteria is maintained in the laboratory as training and reference material. The bacterial strains are purchased from an accredited microbiological supply company and are used as positive and negative reference controls. Alternatively, bacterial strains are collected from proficiency testing samples and laboratory contaminants, and stored as Tryptic Soy Agar slants for 3 months at 4 ± 2ºC.

8.4 INSTRUMENT CALIBRATION

Autoclave

Operating temperature is checked and recorded with each use with a minimum/maximum thermometer. Performance is tested weekly with *Bacillus stearothermophilus* ampoules. Chemical strips are used with each use to verify that supplies and materials have been sterilized. Records of autoclave operations are maintained for every cycle. Records include: date, contents, maximum temperature reached, pressure, time in sterilization mode, total run time (may be recorded as time in and time out) and analyst initials.

Incubators & Waterbaths

The record of temperature checks is documented twice daily at least 4 hours apart when in use. Thermometers used for temperature checks are verified at least annually. In addition temperature chart recorders are being used to continuously monitor the temperature in the incubators used for BOD analysis and the BOD Lab.

Analytical Balances

Analytical balances are checked at least daily prior to each use with class “I” weights. Records of these verifications are maintained within the laboratory. Balances are also serviced and verified and/or calibrated by an external calibration service at least semi-annually.

Microscope

A record of cleaning and alignment for each microscope is maintained in the laboratory. Each microscope has an ocular micrometer that is verified annually with a stage micrometer. All microscopes are calibrated annually by an external calibration service.

Biochemical Oxygen Demand Robotic Analyzer – SOP Number 340303A

The Dissolved oxygen meter is calibrated according to manufacturer's instructions with each use. Air calibration is performed on the DO meter probes to correct DO for the ambient temperature and pressure. The air calibration is confirmed daily using the Winkler Test. During the analytical sequence, the calibration stability of the DO probes is verified after every ten samples and at the end of sequence, by the analysis of continuing calibration verification (CCV). If either of the readings differs from the initial readings by more than 0.2 mg DO/L., the instrument automatically re-calibrates the DO meters and re-reads everything after the last passing CCVs.

A laboratory control sample (LCS) is prepared from glucose and glutamic acid, and is analyzed exactly like a field sample at the beginning of the workgroup, after every twenty samples throughout the, run and at the end of the workgroup, one for each probe to verify that the analytical process is performing accurately.

pH meter

With each use of pH meters, calibrate the instrument according to manufacturer's instructions. The slope is documented on a daily basis. Acceptable pH slope range is 95-105%.

Turbidimeter

With each use, calibrate instrument according to manufacturer's instructions. Adjust transmittance to a 100% using a blank reference test tube. Establish appropriate turbidity range on turbidimeter by adding or subtracting 2% T to the percent transmittance measured with appropriate turbidity standard.

Volumetric equipment

Equipment such as pipettes non-Class A and other containers with graduations are calibrated once per lot prior to first use. Volumetric equipment that is not disposed off after use is calibrated on an annual basis. The error of calibration must not exceed 2.5%.

Air Sampler

The air sampling pump used for laboratory environmental monitoring is calibrated monthly prior to use with a calibrator that is verified annually by a ISO 17025 certified laboratory to ensure its measurement integrity.

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent Grade water –Type II used in the Mold Laboratory is periodically checked for contamination. Type II water is checked annually for single and total heavy metals. Monthly checks for total organic carbon, ammonia and organic nitrogen, total residual chlorine and a heterotrophic plate count are also conducted. Conductivity and pH are checked continuously or with each use.

Prior to first use, a sterility check with non-selective growth media is performed on each batch of dilution and rinse water prepared in the laboratory and on each batch of commercially prepared water.

9.2 GLASSWARE WASHING AND STERILIZATION PROCEDURES

Glassware washing and preparation/sterilization procedures are performed according to EPA guidelines and are outlined in SOP #030701, *Glassware Cleaning*. The glassware used in the mold laboratory is restricted to microscopic slides, cover slips, and screw capped bottles, vials or flasks for preparation of media. Before use, examine microscope slides, and discard items with chipped edges or etched inner surfaces. Prior to use, clean microscopic slides with 70 % isopropyl alcohol. Examine screw-capped bottles, vials or flasks for chipped inner edges that could leak. Screw-capped bottles, vials or flasks are cleaned using the following protocol:

- Prewash with hot tap water. Wash with hot tap water. Wash with non-foaming powder detergent. Rinse with tap water. Rinse with DI water. Dry and cool.
- New glassware will be cleaned according to the same procedure as listed above.

Inspect glassware after washing for excessive water beading and re-wash, if necessary. Perform checks on pH and test for inhibitory residues on glassware and plastic ware. Use utensils and containers of borosilicate glass, stainless steel, aluminum, or other corrosion resistant material for media preparation. Sterilization of any auxiliary equipment is performed via autoclave.

Pipettes of all sizes are checked for sterility by drawing up non-selective media into the pipette and re-dispensing the volume back into original tube that contained the media. The tube is then incubated and monitored for growth. All results are recorded and maintained within the laboratory.

Inoculating loops are cultured by aseptically transferring the entire tip of the loop into a tube containing non-selective media. The tube is incubated and monitored for growth. Results are maintained within the laboratory.

BOD analysis is performed in disposable, pre-sterilized bottles. In the event that glass bottles must be used, the BOD glassware is washed in a commercial laboratory dishwasher using a phosphate free detergent, followed by a nitric acid rinse, with a final rinse of laboratory DI water.

9.3 MEDIA STERILITY VERIFICATION PROCEDURES

A sterility check must be analyzed for each lot of pre-prepared media and for each lot of media prepared in the laboratory. This is done prior to the first use of the media used for membrane filtration or MPN or pour plate and chromofluorogenic methods. For media used in the pour plate testing technique, sterility blanks of the media must be made by pouring an uninoculated plate for each run in addition to sterility and lot comparison tests being performed on each lot prior to first use. All results are documented.

9.4 POSITIVE AND NEGATIVE CONTROLS USING PURE CULTURES

Positive culture controls demonstrate that the media can support the growth of the target organism(s), and that the media produces the specified or expected reaction to the target organism(s). All prepared media must be tested with at least one pure culture of a known positive reaction. This must be done prior to first use of the media.

Negative culture controls demonstrate that the media does not support the growth of non-target organisms or does not demonstrate the typical positive reaction of the target organism(s). All batches of prepared selective media in the laboratory must be analyzed with one or more known negative culture controls. This must be done prior to first use of the media.

New lots of pre-prepared media are evaluated for suitability using manufacturer QC data.

10.0 ANALYTICAL PROCEDURES

A list of laboratory SOPs associated with the Mold and BOD laboratory can be found in the following table:

TABLE 10.1: MOLD DEPARTMENT SOPs

This Table is subject to revision without notice

SOP #	Title
340303	Biochemical Oxygen Demand
340303A	Biochemical Oxygen Demand, Automated
350306	Spore Traps
350307	Fungal Andersen
350308	Fungal Quantification
350309	Fungal Rodac
350310	Direct Exam Prep Procedure
350311	Fungal Identification
350312	Mold QA/QC
350313	Mold Lab Safety
350314	MUG Ecoli/Coliforms
350319	Processing of Bacterial Andersen Samples for Quantification
350334	Microscope Usage
350335	Fungal Spore Identification
350342	BART Testing
350347	Processing of Bacterial Swabs, Bulk, Dust and Water Samples for Quantification
350349	Bacterial Identifiication Using Biolog
350357	Actinomycetes Identification
350379	Mold Lab Reference Culture Maintenance
350367	Labconco Flaskscrubber Operation and Maintenance
350371	Mold lab Autoclave Maintenance and Operation
350372	Mold Lab Balance Calibration and Verification
350373	Preparation of Culture media

11.0 QUALITY CONTROL CHECKS

11.1 ESC participates in proficiency testing (PTs) in support of various laboratory accreditations/recognitions. For Mold analyses, PTs are administered quarterly by AIHA. The samples are received and analyzed by method according to the vendor's instructions and according to the ESC SOP.

For BOD analysis, environmental PTs are purchased from Environmental Resource Associates (ERA). The WP studies are completed every 6 months.

11.2 As part of the total spore analysis QC, the laboratory maintains a slide collection with various count levels and genera/groups of spores. Acceptance criteria for the slide collection include counts that are statistically determined (e.g. ±3STD). Each analyst reviews one slide from this collection on each day of analysis. The slides are reviewed on a rotational basis such that a different slide is reviewed each day until the entire slide collection has been examined. The total spore count and acceptance criteria for each slide are calculated and compared with the statistically determined acceptance criteria.

11.3 Each week, a different pure culture is chosen by the lab supervisor and is identified by each analyst as part of training and continuing QC program.

11.4 Inter- and intra-analyst precision is determined by the re-analysis of samples by the same and different analysts (where possible). The rate of re-analysis by the same analyst and by a second qualified analyst is 5%.

11.5 Media blanks for viable count analysis are used to monitor media and laboratory procedures for contamination. These blanks are utilized in two ways:

- Laboratory media blanks are unexposed fresh media (either recently received from the manufacturer or newly laboratory prepared) that is incubated under the same conditions as those used for analysis.
- Field blanks are unopened media that is handled identically to field samples. These samplers are returned to the laboratory with sampled media to demonstrate that media utilized was not originally contaminated and did not become contaminated during transport.

11.6 Environmental monitoring of the laboratory air and the surfaces in the Mold laboratory is performed monthly. BSLII hoods are also monitored in the Mold laboratory.

11.7 Round Robin studies are performed for direct examination of fungal air samples in accordance with AIHA policy requirements. Results for these studies include raw counts and final concentrations for each fungal structure. Acceptance criteria include organism identification, ranking and quantification.

11.8 Analysts also participate in other continuing education activities, including attending seminars and conferences, in-house training meetings, reviews of journal publications and self-taught training on CD.

11.9 For BOD analysis, Initial Demonstrations of Capabilility (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing Demonstration of Capability must be updated at least annually. The associated data is filed within the department and available for review.

11.10 For BOD analysis, samples are analyzed in batches of 1-20 samples. Each batch must include the following: method blank, seed blank, seed control, seed check, 1 laboratory control sample, 1 sample duplicate/ 10 samples. A calibration check (CCV) is performed every 10 samples and an additional LCS every twenty samples including the end of the sequence.

11.11 A method blank is analyzed for each probe at the beginning and end of the sequence. The method blank is used to define the level of laboratory background and reagent contamination. Only one acceptable method blank is required for each batch. If all method blanks fail, data is qualified. The depletion of the method blank should be between - 0.2 and + 0.2mg DO/L.

11.12 The Seed Blank/Seed Control/Seed Check must deplete to show that the microorganism population is viable. The seed correction factor should be 0.6-1 mg/L

11.13 The CCV should not vary more than 0.2g DO/L within a run.

11.14 The BOD value for the LCS must be within 167.5 and 228.5.

11.15 The RPD for the sample duplicate must be $\leq$5%.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in SOP #030201, *Data Handling and Reporting.* The primary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP is followed
- Sample preparation is correct and complete
- Analytical results are correct and complete
- QC is within criteria and complete

For BOD analysis, the Quality Control Department performs the secondary review of the data package using the ESC SOP#030227, *Data Review*. The QC Reviewer verifies that the analysis is performed as required and meets method criteria, All associated data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required flags on test reports, etc.)

TABLE 12.1 Mold Data Reduction Formulas

PARAMETER	FORMULA
Non-viable (Spore Traps) Mold	$\frac{SporeCount}{m^3} = \frac{\text{number on trace} \times 1000}{\text{Volume of air sampled in liters}}$
Andersen Fungal Viable (Culturable) Mold Spore Andersen Bacterial Viable (Culturable) Bacteria	$\frac{CFU}{m^3} = \frac{\text{raw counts} \times 1000}{\text{Volume of air sampled in liters}}$ $P_c = N\,[1/N + 1/N\text{-}1 + 1/N\text{-}2 + \ldots\ldots 1/N\text{-}r + 1]$
Quantitative Fungal/Bacterial	$\frac{CFU}{gm}$ or $\frac{CFU}{Swab} = \frac{\#\text{ of Colonies} \times \text{Dilution Factor}}{\text{Sample Amount}}$
BOD, 5-DAY	$\frac{\text{Initial D.O.} - \text{Final D.O.} - CF}{\%\text{ Dilution Sample}}$ *Calculations are performed by computer software*

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by reviewing all data entries and calculations for errors, reviewing all documentation to assure that sample information is correct, and that the tests have been performed appropriately and within the appropriate holding times. The secondary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP is followed
- Sample preparation is correct and complete
- Analytical results are correct and complete

For BOD analysis, once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.3 for current QC targets, controls and current reporting limits for BOD analysis.

12.3 REPORTING

Reporting procedures are documented in SOP #030201, *Data Handling and Reporting.*

BOD Control Limits: BOD QC targets are statutory. The laboratory calculated limits verify the validity of the regulatory limits. The BOD QC targets are within the range of 5 to 15% for accuracy, depending on determinative method requirements, and, where applicable, <20% RPD for precision, unless laboratory-generated data indicate that tighter control limits can be routinely achieved. When using a certified reference material for QC sample analysis, the acceptance limits used in the laboratory will conform to the provider's certified ranges for accuracy and precision.

Table 12.3: QC Targets for BOD Lab Accuracy (LCS), Precision and RLs *This table is subject to revision without notice*					
Analyte	**Analysis Method**	**Matrix**	**Accuracy Range (%)**	**Precision (RPD)**	**RL (ppb)**
Biochemical Oxygen Demand	SM5210B	W	85-115	≤5	5000
Biochemical Oxygen Demand - Carbonaceous	SM5210B	W	85-115	≤5	5000

13.0 13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The reason for the nonconformance is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CAR will be kept on file by the QA department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these control limits are exceeded, corrective action must be taken. All samples and procedures are governed by ESC's quality assurance program. General corrective actions are followed; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate SOP.

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria will take precedence.

13.2.2 Out of Control RPD for inter- and/or intra-analyst reanalysis.

Rejection Criteria - RPD value of the original analysis is calculated and must be below the current control limit.

Corrective Action - Both first and second analysts re-analyze the sample until a consensus is reached and the RPD value falls within control limits.

13.2.3 Out of Control RPD for inter-analyst analysis.

Rejection Criteria – All organisms must be accurately identified.

Corrective Action - Both first and second analysts review the sample. The second analyst results are reported to the client.

13.2.4 Calibration Verification criteria are not met: BOD Analysis

Rejection Criteria see section 8.4

Corrective Action- If the CCV fails, the data may still be used. If the failure persists, check cleanliness of the equipment and stability of the DO probe for subsequent runs. If a problem persists, the group supervisor or QA Department is notified for further action.

13.2.5 Out of Control Blanks: Applies to Method Blank

Rejection Criteria- Blank depletion is greater than established limit.

Corrective action- only one acceptable method blank is required for each batch. If both blanks fail, all data must be reported with a qualifier.

13.2.6 Out of Control Laboratory Control Standards (LCS)

Rejection Criteria- If the performance of associated laboratory control sample(s) is outside of lab-generated control limits calculated as the mean of at least 20 data points +/- 3 times the standard deviation of those points. (Listed in Section 12).

Corrective Action- All samples bracketed by the failed LCS must be reported with a qualifier.

13.2.7 Out of Control Duplicate Samples

Rejection Criteria- Lab-generated maximum RPD limit (as listed under precision in Section12)

Corrective Action- The sample and duplicate are reported with a qualifier.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #010103, *Document Control and Distribution*, SOP #030203, *Reagent Logs and Records* and SOP #030201, *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 8.0.

1.0 SIGNATORY APPROVALS

Protozoa Laboratory
QUALITY ASSURANCE MANUAL

APPENDIX XII TO THE ESC QUALITY ASSURANCE MANUAL

for

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This manual discusses specific QA requirements for EPA Methods 1622 and 1623 to ensure that analytical data generated from the protozoan laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the client with both routine and specialized services, field sampling and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in Section 4.0 in the *ESC Quality Assurance Manual Version 8.0.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Dr. Christabel Fernandes-Monteiro, with a Ph.D. in Applied Biology, is the Department Manager of Biology. She oversees supervision of laboratory operations in the Mold, Aquatic Toxicity, Microbiology, Protozoan and BOD laboratories. Her responsibilities include assurance of reliable data through monitoring of quality control, corroborating the analysis performed, protocol development, coordination with clients regarding sample analysis, scheduling of tests and overall production in all sections within the Biology Laboratory, including management of staff.

Kasey Raley, with a B.S. degree in Biological Sciences, is the Principal Analyst for the Protozoan laboratory. Ms. Raley is proficient in performing EPA Methods 1622 and 1623. She gained analytical experience from an accredited Protozoan laboratory and obtained additional training on microscopic techniques. Also, she frequently reviews EPA online training modules related to the methods being performed. In her absence, Nacole Jinks assumes her responsibilities.

5.2 TRAINING

The certified analyst trains all new analysts to the Protozoan laboratory according to ESC protocol and EPA guidelines. ESC's training program is outlined in SOP #350405, *Training Protocol for Method 1622/1623.* Documentation of training received and authorizations to perform these analyses are maintained within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the laboratory is approximately 420 square feet and has roughly 67.5 square feet of bench area. The microscope dark room is located in the back of the laboratory is 36 square feet with 18 square feet of bench area. Additionally, there is 40 square feet of storage and fluorescent lighting throughout all areas. The air handling system is a five-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the Siemans Elga UltraPure deionizer system. Biohazard containers are located in the protozoan laboratory and Stericycle serves as ESC's biological waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where infectious aerosols or splashes may occur are conducted in biological safety II cabinets.
- The following Biosafety Level 2 (BSL2) guidelines are adhered to:
  - Closed-toe shoes are worn in the laboratory
  - Floors and work surfaces are cleaned on a regular basis
  - Emergency numbers are posted in the laboratory
  - Biological safety hoods are tested and certified annually
  - Laboratory personnel are trained in the use of the biological spill kit and emergency safety equipment
- ESC's laboratory safety guidelines are detailed in SOP #350408, *Biosafety Guidelines for the Cryptosporidium Laboratory*.

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- A description of field sample collection, containers, storage, temperature, and transport times are located in SOP #350402, *Method 1622/1623 Field-Filtering Sample Collection and Laboratory Delivery* and SOP #350403, *Method 1622/1623 Bulk Sample Collection and Laboratory Delivery.*
- Laboratory sample identification, handling, tracking and the information recording system are found in the following procedures: SOP #350404, *Method 1622/1623 Sample Receiving* and SOP #060105, *Sample Receiving*.
- A Chain of Custody and LT2 Sample Collection Form accompanies all samples received by the lab. This is necessary to prove the traceability of the samples and to document the change in possession from sampling through receipt by the laboratory. Prior to analysis, all samples are checked for integrity.
- Following analysis, the slides are maintained for a minimum of 2 months and disposed of following all State and Federal regulations governing disposal.
- Requirements for sample acceptance is located in SOP #350404, Section 7.0, *Method 1622/1623 Sample Receiving*.

8.0 EQUIPMENT

Laboratory equipment specifications are outlined in SOP #350407, *Microscope Analyst Verification,* SOP #350410, *IEC CRU-500 Centrifuge Operation and Maintenance,* SOP #350411, *Lab-Line Multi-Wrist Shaker Operation and Maintenance* and SOP #350413, *Olympus BX40 Microscope Operation and Maintenance.*

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Protozoan		
Item	***Manufacturer***	***Model***
Flow control valve	Plast-o-matic	FC050B
Centrifugal pump	Jabsco	18610-0271
Graduated container	Nalgene	20 Liter Carboy
Laboratory shaker	Lab-Line	3587-4
Laboratory shaker side arms	Lab-Line	3589
1500 XG swinging bucket centrifuge	Damon/IEC Division	CRU-5000
Sample mixer/rotator	DYNAL	Cat#: 947.01
Magnetic Particle Concentrator	DYNAL	MPC-1
Magnetic Particle Concentrator	DYNAL	MPC-S
Magnetic Particle Concentrator	DYNAL	MPC-6
Flat-sided sample tubes	DYNAL	Cat#: 740.03
Epifluorescence/differential interference contrast microscope	Olympus	BX-40
Excitation/band pass microscope for fluorescein isothiocyanate (FTIC)	C-Squared	UN3100
Excitation/band pass filters for 4',6-diamidino-2-phenylindole (DAPI)	C-Squared	UN41001

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

Calibration of equipment is conducted on an annual and/or semi-annual basis and is documented. Maintenance and cleaning is conducted on an as needed basis or per manufacturer's instructions. Equipment cleaning is specified in SOP #350412, *Cryptosporidium Laboratory Equipment Cleaning.*

8.3 STANDARDS AND REAGENTS

Table 8.3A: Stock solution sources, description and related information.
(subject to revision as needed)

Description	Vendor	Concentration	Storage Req.	Expiration
Sodium Hydroxide (NaOH)	VWR	Concentrated	ambient	1 year
Hydrochloric Acid (HCl)	VWR	Concentrated	ambient	1 year
Laureth-12	VWR	--	ambient	1 year
Tris Stock	VWR	--	ambient	NA
EDTA	Supelco	0.5 M, pH 8.0	2 - 8°C	1 year
Antifoam A	Supelco	--	ambient	NA
Dynabeads® GC-Combo/Crypto	Idexx	--	2 - 8°C	2 years
Direct labeling kit for det. of oocysts and cysts, Merifluor Cryptosporidium/Giardia	VWR	--	2 - 8°C	1 year
Phosphate Buffered Saline (PBS) Solution, pH 7.4	Supelco	--	ambient	1 year
4', 6-diamidino-2-phenylindole (DAPI) stain	Waterborne, Inc	2mg/mL	2 - 8°C /Darkness	When positive control fails
Purified, live *Cryptosporidium* oocysts stock suspension	WSLH	--	2 - 8°C	1 month
Purified, live *Giardia* cysts stock suspension	WSLH	--	2 - 8°C	1 month

TABLE 8.3B: Working Solution Descriptions and Related Information.
(subject to change)

Solution	Concentrations	Storage Requirements	Expiration
Sodium Hydroxide (NaOH)	6.0 N	ambient	1 year
Sodium Hydroxide (NaOH)	1.0 N	ambient	1 year
Hydrochloric Acid (HCl)	6.0 N	ambient	1 year
Hydrochloric Acid (HCl)	1.0 N	ambient	1 year
Hydrochloric Acid (HCl)	0.1 N	ambient	1 year
Laureth-12 stock vials	10g/100mL	-10°C to –20°C	1 year
Tris Working Solution	1 M, pH 7.4	ambient	3 months
Elution Buffer	--	ambient	1 week
1X SL Buffer A Solution	--	2 - 8°C	1 week
Staining 1X wash buffer	--	ambient	3 months
Phosphate Buffered Saline (PBS) Solution, pH 7.4	--	ambient	1 week
Working DAPI stain	10µL Stock/25ml Phosphate Buffer	Ambient/Dark container	1 day

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

ASTM Type II grade water: Reagent water is analyzed for total chlorine, heterotrophic bacteria, specific conductance, pH, total organic carbon, ammonia and organic nitrogen on a monthly basis. Reagent water is tested for metals: Lead, Cadmium, Chromium, Copper, Nickel, and Zinc on an annual basis.

9.2 GLASSWARE WASHING AND STERILIZATION PROCEDURES

Glassware washing and preparation/sterilization procedures are outlined in SOP #350414, *Steamscrubber Operation and Maintenance*, SOP #350408, *Biosafety Guidelines for Cryptosporidium Laboratory* and SOP #350412, *Cryptosporidium Laboratory Equipment Cleaning*.

Laboratory glassware and plastic ware are checked for acceptability prior to use. Glassware acceptance criteria are documented in SOP #350412, *Cryptosporidium Laboratory Equipment Cleaning*.

9.3 FILTER ACCEPTANCE

Each new lot of filters is checked for acceptability prior to use by performing method blanks (MB) and ongoing precision and recovery testing (OPR) on the lot.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the protozoan laboratory can be found in the following table:

TABLE 10.1: PROTOZOAN DEPARTMENT SOPs

This Table is subject to revision without notice

SOP #	Title
350401	Isolation & Identification of *Giardia* and/or *Cryptosporidium* in Water
350402	Method 1622/1623 Field-Filtering Sample Collection and Laboratory
350403	Method 1622/1623 Bulk Sample Collection and Laboratory Delivery
350404	Method 1622/1623 Sample Receiving
350405	Training Protocol for Method 1622/1623
350406	Data Collection and Verification for Method 1622/1623
350407	Microscope Analyst Verification
350408	Biosafety Guidelines for *Cryptosporidium* Laboratory
350409	IPR, OPR and MS Spiking Procedures and Corrective Actions
350410	IEC CRU-5000 Centrifuge Operation and Maintenance
350411	Lab-Line Multi-Wrist Shaker Operation and Maintenance
350412	*Cryptosporidium* Laboratory Equipment Cleaning
350413	Olympus BX40 Microscope Operation and Maintenance
350414	Steamscrubber Dishwasher Operation and Maintenance

10.2 The following references are used for analytical procedures conducted in the laboratory:

- EPA. Method 1623: *Cryptosporidium* and *Giarda* in Water by Filtration/IMS/FA, December 2005.
- EPA. Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA, December 2005.
- EPA. Microbial Laboratory Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule. February 2006.

11.0 QUALITY CONTROL CHECKS

11.1 ESC participates in proficiency testing (PT) through the analysis of spiked vials received from Wisconsin State Laboratory of Hygiene (WSLH) and analyzed according to study instructions and the ESC SOP. When the analysis is completed, the results are reported to the US Environmental Protection Agency (EPA) who issues the testing results as either a "pass" or "fail". If the laboratory fails a PT round, a follow-up test is performed in an attempt to meet the necessary requirements. If the follow-up test results in a second failure, the laboratory takes part in a re-training program offered by the EPA or another accredited laboratory.

11.2 An Ongoing Precision and Recovery sample (OPR) is analyzed once weekly or per 20 samples. The OPR is spiked with 100-500 cysts and/or oocysts from a spiking vial received from the WSLH. Recoveries from the OPR must fall within EPA approved QC limits: Oocyts = 22-100% and Cysts = 14-100%.

11.3 A Method Blank is also analyzed once weekly or per 20 samples. The Method Blank must be free of other test organisms and serves as a sterility control on the analytical system.

11.4 If either sample falls outside acceptance parameters, corrective action must be taken and the samples re-analyzed until the QC criteria are met. Client samples may only be analyzed following acceptable QC sample results. Quality control information is located in SOP #350409, *IPR (Initial Precision and Recovery), OPR (Ongoing Precision and Recovery) and MS (Matrix Spike sample), Spiking Procedures and Corrective Actions.*

11.5 Clients are required to send a duplicate sample early in their sampling schedule and then again for every 20 field samples collected. This duplicate is utilized in the laboratory as a Matrix Spike (MS). The MS is spiked in the same manner and with the same number of organisms as the OPR to determine the effects of the matrix on the analytical process.

11.6 Inter/intra-analyst precision is determined, at least monthly.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

- The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in SOP #350401, *Isolation and Identification of Cryptosporidium and/or Giardia in Water* and SOP #350406, *Data Collection and Verification for Method 1622/1623.*

12.2 VALIDATION

Guidelines for data validation are found in SOP #350406, *Data Collection and Verification for Method 1622/1623.* In general, data integrity involves reviewing all data entries and calculations for errors, reviewing all documentation to assure that sample information is correct, and that the tests have been performed appropriately and within the appropriate holding times. The secondary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP is followed
- Sample preparation is correct and complete
- Analytical results are correct and complete

12.3 REPORTING

Reporting procedures are documented in SOP #350406, *Data Collection and Verification for Method 1622/1623.* Depending on the needs of the client one or more of the following may be included: Case narrative, Chain of Custody, Internal Chain of Custody, Final Report, Raw Data, etc. When the package involves more than just QC forms, it must contain a Table of Contents and Pagination. When the package is complete, it must be reviewed first by the Primary Analyst followed by the Department Manager or second qualified analyst. The final review person signs that the information is complete and the package is ready for submission to the client. A copy of the final package must be kept on file.

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CAR is kept on file by the QA Department. Corrective action procedures are documented in the SOP #350409, *IPR (Initial Precision and Recovery), OPR (Ongoing Precision and Recovery) and MS (Matrix Spike sample), Spiking Procedures.*

13.2 Required Corrective Action

13.2.1 If a spiked sample or set of samples fails to meet quality control limits

Rejection Criteria - Recoveries from the OPR fall beyond the approved QC limits: Oocyts = 22-100% and Cysts = 14-100%.

Corrective Action - Examine the spiking suspension organisms directly. To determine if the failure of the spike is due to changes in the microscope or problem with the antibody stain, re-examine the positive staining control, check Köhler illumination, and check the fluorescence and DAPI. To determine if the failure of the spike is attributable to the separation system, check the system performance by spiking a 10mL volume of reagent water with 100-500 cysts and/or oocysts and processing the sample through the IMS, staining and examination procedures. Recoveries should be greater than 70%. If the failure of the spike is attributable to the filtration/elution/concentration system, check the system performance by processing spiked reagent water according to the method and filter, stain and examine the sample concentrate. This process is performed until the cause of the failure is isolated and corrected. The sample then must be re-analyzed until acceptable results are achieved.

13.2.2 Method Blank contains positive organism when analyzed.

Rejection Criteria – The Method Blank must be free of test organisms and serves as a sterility control on the analytical system.

Corrective Action - Equipment used to process the sample may be cleaned and/or replaced. Reagents used to process the sample may be disposed of and new reagents purchased or prepared. New method blank is prepared and analyzed. This process is repeated until the method blank passes the acceptance criteria.

13.2.3 Inter/intra-analyst precision analyses are beyond ±10%.

Rejection Criteria – Results for inter and/or intra-analyst precision must be within 10% of original results.

Corrective Action - The differences are discussed between analysts until a consensus is found.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #010103, *Document Control and Distribution*, SOP #030203, *Reagent Logs and Records* and SOP #030201, *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 8.0.

End Of Document

APPENDIX B

Relevant Standard Operating Procedures (SOPs) and Field Forms

SOP 1
SOIL SAMPLING AND LOGGING

Introduction

This SOP describes the procedures for properly collecting, handling, and logging soil samples. Method-specific sampling techniques are presented in the following SOPs:

SOP 2	Surface Soil Sampling
SOP 4	Test Pit and Excavation Soil Sampling
SOP 5	GeoProbe Sampling
SOP 13	Field Instrument Calibration
SOP 17	Equipment Decontamination
SOP 20	Sample Handling and Documentation
SOP 39	Niton XRF Field Screening

Equipment

Equipment needs will vary, depending on the sample collection or drilling method. Refer to the appropriate SOP listed above for method-specific equipment needs.

Procedures

Non-Sleeved Grab Samples

Immediately upon receiving the sample, either from the split spoon or backhoe bucket, the material will be screened with the appropriate direct reading instrument, such as a PID or XRF, and the reading will be recorded on the log form or in the field notebook. The portion of the sample collected for chemical analysis will be transferred immediately into the appropriate sample container using decontaminated equipment, new wooden tongue depressors, or by hand wearing new disposable chemical-resistant gloves. Avoid gravels and rock fragments when filling soil sample containers. If the sample is to be analyzed for volatile organics, the container will be completely filled with soil to minimize headspace. The container will be labeled appropriately and immediately stored in an iced cooler to maintain a temperature of 4° Celsius. The following information will be included on the sample container label:

- Sample identification
- Project name
- Project number
- Date and time collected
- Sampler's initials

This information above should also be recorded in the field notebook.

Grab Samples Using Sleeves (auger drilling methodology)

When sampling for volatile compounds, the sample will be kept in the brass or plastic sleeves, and the sleeves will be handled with chemical-resistant gloves. The sample will be screened with the direct reading instrument by exposing the end of one sample tube to the instrument probe. The sample sleeve selected for chemical analysis will be packaged immediately by covering each end of the sleeve with Teflon™ tape and sealed with plastic

caps. The sample sleeve will be labeled as described above and immediately stored in an iced cooler to maintain a temperature of 4° Celsius.

Grab Samples Using Sleeves (Geoprobe drilling methodology)
The sample sleeve will be cut and the sleeves will be handled with chemical-resistant gloves. The sample will be screened with the direct reading instrument by removing a portion of the sleeve, exposing the soil to the instrument probe. The soil sample selected for chemical analysis will be packaged immediately into laboratory-supplied soil jars, labeled as described above, and immediately stored in an iced cooler to maintain a temperature of 4° Celsius.

Composite Soil Samples
Composite samples will be prepared by placing equal amounts of soil in a stainless steel bowl or a clean plastic bag using a stainless steel spoon or by hand wearing new chemical-resistant gloves. The sample will be homogenized with a stainless steel spoon or gloved hand. The homogenized soil will be packaged in a laboratory-supplied sample container, labeled appropriately, and placed in an iced cooler to maintain a temperature of 4° Celsius.

Soil Logging

A description of visual soil characteristics will be recorded for all soil samples. The soil description may include the following information (in the order listed below):

- Soil type according to unified soil classification system
- Color according to the Munsell color chart
- Grain size and roundness
- Percentage fines, sands, and gravels
- Presence of interbedding, and number and thickness of layers
- Description of odors, staining, or sheen
- Density or stiffness
- Relative moisture content

A description of soil types and various field tests for soil classification is given at the end of this SOP.

The following information will be recorded in the appropriate spaces provided on the sample log form:

- Depth of all drive samples;
- Sample interval submitted for laboratory analysis;
- Meter reading from direct-reading instrument (if applicable);
- Contacts between soil types.

In addition to logging soils, the geologist will record the occurrence of first water and the approximate static water level within each borehole. The reference point for all subsurface measurements will be included on all boring logs (i.e., feet below ground surface).

Decontamination

Strict decontamination procedures will be used to prevent cross-contamination of samples. The soil sampling tool (e.g., auger barrel, split spoon) will be decontaminated between sample locations by washing the tool with an Alconox detergent solution followed by a triple rinse of clean potable water and a final rinse with distilled water. After decontamination,

sample tools will be stored in a clean area and placed into their appropriate storage containers after use. Sample personnel will change into a new pair of chemical-resistant gloves between samples and the previously worn gloves will be discarded.

When possible, samples will be collected using disposable equipment to avoid the need for decontamination.

Unified Soil Classification System

The following is an overview of classifying soil according to the USC system. The distinction between soil types is based on the percentage of fine vs. coarse material in a sample. This is easily done in a laboratory but involves a lot of guesswork in the field. The key is to be consistent. If you are fortunate enough to have samples submitted to a geotechnical lab for sieve analysis, check your field classifications against the laboratory results. This will help you estimate percentages in the field.

1) Distinguishing Coarse-grained from Fine-grained Soils:

   A) Determine if material is predominantly coarse grained (sand or gravel) or fine grained (silt or clay). Coarse-grained materials are those with more than 50% retained on a No. 200 sieve (very fine-grained sand or larger).

   B) If coarse-grained, determine if it is predominantly sand or gravel. Be aware that in the USCS system, pea gravel-size particles are considered "very coarse grained sand."

   C) Further classify material based on the amount of fines present. Roughly, no or very little fines is a SP or GP classification; slight amount of fines is a GP-GM or a SP-SM classification; much fines is a GM or SM classification. The following chart shows the breakdown for these classifications.

Classification of Coarse-grained Sands
>50% larger than No. 200 sieve

Percentage Fines	Soil Name	USC Designation
<5% Fines	Gravel Sand	GP or GW[1] SP or SW[1]
5-12% Fines	Gravel with Silt or Clay Sand with Silt or Clay	GP-GM or GP-GC SP-SM or SP-SC
>12%	Silty or Clayey Gravel Silty or Clayey Sand	GM or GC SM or SC

[1] - The designation SW or GW means well sorted -not well graded (confusing for geologists). This is a condition not normally found in natural depositional environments and usually indicates engineered fill. Do not use this classification unless you think the material is specifically graded-engineered fill.

D) If material is fine grained, determine if any coarse-grained materials are present. Note that all fine-grained materials have the same USC designation. Therefore, you must use both the name and the designation to adequately describe the soil. Use the following chart to classify fine-grained materials.

Classification of Fine-grained Soils
>50% passing No. 200 sieve

Percentage Coarse	Soil Name	USC Designation
<15% Coarse	Silt	ML, MH
	Clay	CL, CH
15-29% Coarse	Silt w/Coarse	ML, MH
	Clay w/Coarse	CL, CH
>29% Coarse	Sandy Silt	ML, MH
	Gravelly Silt	ML, MH
	Sandy Clay	CL, CH
	Gravelly Clay	CL, CH

2) Classification of Fine-grained Soils

A) Distinguish clay from silt. The following are field tests for determining if a material is clay or silt.

1) Dilatency (reaction to shaking)

Remove course-grained materials. Prepare a pat of moist soil with a volume of about 1/2 cubic inch. Add enough water if necessary to make the soil soft but not sticky. Place the pat in the open palm of one hand and shake horizontally, striking vigorously against the other hand several times. A clean fine-grained sand will rapidly show water on the surface and become glossy. When squeezed between fingers, the gloss disappears from the surface, the pat stiffens and finally cracks or crumbles. A very plastic clay will show little reaction to shaking and squeezing; an inorganic silt will react somewhere in between.

2) Dry strength (crushing characteristics)

After removing coarse-grained particles, mold a pat of soil to a 1/2-inch cube, adding water, if necessary. Allow to dry completely. Test the strength of the dry cube by crushing between fingers. The dry strength increases with increasing plasticity, with a plastic clay having high dry strength. An inorganic silt and silty fine-grained sands are similar. Fine sand feels gritty where silt has a smooth, flour-like feel.

3) Toughness (consistency near plastic limit)

The worm test: roll soil into a rope (or worm). A clay can usually be rolled to 1/8-inch diameter before it breaks.

B) CH vs. CL and MH vs. ML

C) Additional Characteristics

1) Relative Density (coarse-grained material)

Blows per foot	Relative Density
<4	very loose
4 - 10	loose
10 - 30	medium dense
30 - 50	dense
> 50	very dense

2) Consistency (fine-grained material)

Blows per foot	Consistency	Field Test
0 - 2	very soft	easily penetrated several inches with fist
2 - 4	soft	easily penetrated several inches with thumb
4 - 8	medium stiff	penetrated several inches by thumb with moderate effort
8 - 15	stiff	readily indented by thumb but penetrated only with great effort
15 - 30	very stiff	readily indented by thumbnail
> 30	hard	indented with difficulty by thumb nail

3) Relative Moisture

Moisture is measured relative to its optimum water content for compaction. Use the following descriptions:

Relative Moisture	**Field Test**
Dry	does not contain water.
Slightly Moist	damp, will not hold together.
Moist	soil will reach its maximum compaction under pressure.
Wet	contains excess moisture for compaction.
Saturated	below the water table.

SOP 2
SURFACE SOIL SAMPLING

Introduction

This SOP describes the procedures for sampling surface soils from ground surface to 12 inches below ground surface. Samples may be collected with a decontaminated shovel or drive barrel.

Equipment

- Sample driver apparatus
  - Drive barrel
  - Brass sleeves
  - Rod and slide hammer
- Teflon™ tape and end caps to seal brass sleeves
- Laboratory-supplied sample containers if not using brass sleeves
- Decontamination Supplies
  - Buckets
  - Alconox Detergent
  - Distilled water
  - Scrub brush
- Direct Reading Instrument (PID and/or XRF)
- Tape Measure
- Log Forms/Field Notebook

Preliminaries

Soil sample locations will be determined from the project-specific work plan. If necessary, concrete coring will be arranged before mobilizing to the field.

Procedures

Soil will be collected and placed into laboratory-supplied sample containers with a stainless steel spoon or with a gloved hand. Coarse-grained soils, such as gravel and rock fragments, will be avoided whenever possible. To prevent loss of volatiles, soil will be packed tightly inside the sample container so that no headspace is present.

If soil samples are being collected with a sample driver, brass sleeves will be placed inside the sample barrel and the sampler will be driven to the desired depth with the slide hammer. After the sample barrel is retrieved, the brass sleeves will be removed and the ends of each sleeve will be covered with Teflon™ tape and sealed with plastic caps. Samples will be labeled appropriately and immediately stored in an iced cooler to maintain a temperature of 4° Celsius. The sample depths and locations will be measured and documented in the field notebook with the soil description.

SOP 4
TEST PIT/EXCAVATION SOIL SAMPLING

Introduction

This SOP describes the equipment and procedures for collecting soil samples from test pits and excavations. Samples may be collected from the backhoe bucket or from the excavation wall, provided the excavation meets safe entry requirements.

Equipment

- Stainless steel trowel or disposable wooden tongue depressors
- Sample containers
- Decontamination supplies
  - Buckets
  - Alconox detergent
  - Distilled water
  - Scrub brush
  - Direct reading instrument
- Tape measure
- Log forms/field notebook
- Laboratory-supplied sample containers

Preliminaries

All sample locations will be determined using the project-specific work plan. Arrangements will be made for the location of underground utilities using Blue Stakes. A private locating service will be used for utilities that are not covered by Blue Stakes.

Procedures for Sampling from Backhoe Bucket

Each backhoe bucket of soil will be screened with the appropriate direct reading instrument and readings will be recorded in the field notebook. Soil samples selected for laboratory analysis will be collected from the backhoe bucket taking care to avoid sloughed material. Samples will be packed in laboratory-supplied containers so that no headspace is present. Each sample will be labeled with the following information:

- Sample identification
- Project name
- Project number
- Date and time collected
- Sampler's initials

The information above should also be recorded in the field notebook.

The location, depth, and soil description of each sample will be recorded in the field notebook.

Procedures for Sampling Directly from Pit Wall (less than 5 feet deep)

A fresh surface will be scraped from the pit wall using a decontaminated stainless steel trowel. The soil on the pit wall will be screened with a direct reading instrument and the reading will be recorded in the field notebook. A soil sample will be collected by either

pushing a brass sleeve into the wall of the excavation, or by removing material with the trowel and packing it into the sample container. To prevent loss of volatiles, the brass sleeve or sample jar should be packed full so that no headspace is present. Each sample will be labeled as described in the section above and this information will be recorded in the field notebook. The location, depth, and soil description of each sample will be recorded in the field notebook.

Decontamination

Strict decontamination procedures will be used to prevent cross contamination of samples. The soil sampling tool (e.g., auger barrel, split spoon) will be decontaminated between sample locations by washing the tool with an Alconox detergent solution followed by a triple rinse of deionized water. After decontamination, sample tools will be stored in a clean area and placed into their appropriate storage containers after use. Sample personnel will change into a new pair of chemical-resistant gloves between samples and the previously worn gloves will be discarded.

SOP 5
Geoprobe Sampling

Introduction

Geoprobe™ sampling equipment will be used to advance shallow soil borings (30 feet or less) to collect soil and groundwater samples and for sites where access restrictions prevent mobilization of a drill rig. Standard operating procedures for geoprobe soil and groundwater sampling are described below.

Preliminaries

Geoprobe sample locations will be marked or staked in the field and coordinated with the IHI project manager and, if necessary, the client's project manager. Blue Stakes utility clearance will be requested for each boring location prior to geoprobe sampling. Borings will be located at least two feet from marked underground utilities.

All sampling equipment will be decontaminated according to SOP 17 prior to mobilizing to the site. This equipment includes all geoprobe rods, geoprobe samplers, and stainless steel bowls and spoons.

Geoprobe Equipment and Procedures

Soil borings will be advanced and sampled using a geoprobe hydraulic hammer mounted to a truck, van, three-wheeler, or small tractor. Each borehole will be started by hydraulically hammering steel drill rod with a disposable pointed steel end point into the ground. The borehole will be advanced in regular increments, available in varying lengths from 2 to 5-feet, by adding sections of flush-threaded drill rod to the drill stem already in the ground. No lubricants or additives will be used while advancing geoprobe borings.

Soil Sampling Equipment

The following equipment will used to conduct soil sampling:

- Geoprobe core sampler (supplied by the geoprobe contractor)
- New polybuterate sample liners (supplied by the geoprobe contractor)
- New sample liner end caps (supplied by the geoprobe contractor)
- Chemical-resistant gloves
- Appropriate personal protection equipment according to the HASP
- Sealable plastic bags
- Sample labels
- Laboratory-supplied glass soil sample jars and labels (optional)
- Stainless steel putty knife
- Stainless steel bowl and spoon
- Photoionization detector (PID)
- Cooler and ice
- Munsell color chart
- Unified Soil Classification System (USCS) chart

Soil Sampling

Samples will be collected as specified in the site-specific sampling plan. At a minimum, soil samples will be collected at regular intervals if lithologic information is needed. Each soil sample will be collected in a drill rod sampler lined with a clear polybuterate sample sleeve. The sampler will be attached to the drill rod, lowered to the sample interval, opened, and then hydraulically hammered into the subsurface.

The polybuterate sleeves may be used as sample containers for sites being analyzed for VOCs and semi-VOCs, using the following procedure. After the sampler has been retrieved from the borehole, the sample shoe will be removed from the sampler and the soil contents will be sealed in a plastic bag for headspace analysis. If the sample shoe is empty, a small amount of soil will be removed from the portion of the liner immediately above the sample shoe. The soil will be allowed to equilibrate in the plastic bag for approximately 15 minutes. The headspace vapors inside the bag will be measured by pushing the PID tip through one side of the plastic bag into the headspace of the bag. The maximum PID reading over a 30-second interval will be recorded at the corresponding depth on the soil-boring log. Following headspace sample collection, soil will be removed from each end of the polybuterate liner for soil classification. If recovery is poor, the headspace sample will be used for soil classification after the headspace reading has been measured and recorded on the boring log.

The polybuterate liner will be trimmed flush on each side to minimize headspace, and each end will be covered with Teflon tape. Each end of the liner will then be sealed tightly with polybuterate end caps. The sample will be labeled and immediately placed in an iced cooler to maintain a temperature of 4°C.

In general, the sample liner associated with the highest headspace reading will be submitted for VOC and semi-VOC analysis. If headspace readings are zero for all samples, odors, soil staining, and clay-rich (high sorption) lithology will be used as selection criteria.

Soil Sampling Using Laboratory-Supplied Soil Jars

The sample sleeve will be cut and the sleeves will be handled with chemical-resistant gloves. The sample will be screened with the direct reading instrument by removing a portion of the sleeve, exposing the soil to the instrument probe. The soil sample selected for chemical analysis will be packaged immediately into laboratory-supplied soil jars, labeled as described above, and immediately stored in an iced cooler to maintain a temperature of 4° Celsius.

Sample Selection Criteria for Laboratory Analysis

In general, the sample liner associated with the highest headspace reading will be submitted for VOC and semi-VOC analysis. If headspace readings are zero for all samples, odors, soil staining, and clay-rich (high sorption) lithology will be used as selection criteria.

Groundwater Sampling

To facilitate the collection of groundwater samples at sites where the water table is penetrated, a temporary well point will be installed in the geoprobe borehole. After the water table has been encountered, the borehole will be advanced at least three more feet to ensure adequate sample volume. The well point may consist of either a three-foot long stainless steel screen drill rod attachment or slotted PVC screened in a similar interval. New tubing and well screens will be used for each well point. After approximately 15 minutes, a

peristaltic pump will be attached to the tubing to obtain groundwater samples by the following analyte order in the appropriate laboratory-supplied pre-preserved sample containers:

1) VOCs and BTEXN
2) Semi-VOCs
3) Total Petroleum Hydrocarbons
4) Oil and Grease
5) Filtered metals

Groundwater samples collected for metals analysis will be filtered using in-line filters attached to the outlet tubing of the peristaltic pump or with Nalgene™ hand-pump filters.

The sample will be labeled and immediately placed in an iced cooler to maintain a temperature of 4°C.

Boring Abandonment

After all soil and groundwater samples have been collected, each soil boring will be backfilled with granular bentonite. Borings that were drilled through asphalt or concrete will be backfilled with granular bentonite to within six inches of the ground surface and the asphalt and concrete cores will be restored.

Demobilization

After the equipment has been rigged down and loaded, the site will be cleaned and restored as close to its original condition as possible. All sampling equipment will be decontaminated prior to mobilizing to the next geoprobe sample location.

SOP 10B
Monitoring Well Design and Installation (using direct push drilling)

Introduction

This SOP describes procedures for the drilling and installation of shallow monitoring wells within the unconfined water table aquifer using direct-push (e.g. "Geoprobe") equipment. Site-specific conditions may warrant deviating from these standard designs. Field personnel should consult with the project manager and the work plan before deviating from the basic design.

Well Design

The typical well design to be used is intended to provide water samples of the upper 5-10 feet of the water-bearing zone. The well screens will be 10-feet long and will be set so that the top of the screen is at least two feet above the highest-observed water level.

Casing and Screen Materials

In general, well materials will be 1-inch to 2-inch-diameter, schedule 40, flush-threaded, PVC. All joints will be flush-threaded. The perforated zone will be constructed from machine slotted 0.010-inch or 0.020-inch slot screen. A six-inch long sump (silt trap) will be placed at the bottom of the screen. Depending on site conditions, well materials can vary, including different diameter casings, different schedule ratings for the PVC, etc.

Sand Pack

The sand pack material will be a commercially packaged, inert, non-carbonate, well rounded, sieved, product of clean, silica sand. In general, a sand of 16-40 to 10-20 mesh should be used with 0.020-inch slot well screen. The sand pack will be placed from the bottom of the boring up to 1 foot above the top of the screened section.

Bentonite Seal

A bentonite seal will be installed in the annulus above the sand pack to prevent grout from infiltrating into the screen and sand pack zone. Bentonite chips may be used for the seal if it is placed above the water table. Pellets should be used below the water table, as they have a higher density than the chips and will settle through the water better.

Annular Seal

Shallow wells (less than 20 feet of annulus above the bentonite seal) can be sealed with bentonite chips, which are hydrated in place with potable water. Wells that have a longer annular space should be sealed with a cement grout mixed at a ratio of 6.5 to 7 gallons of water to each sack of cement, with about 3 to 5 lbs. of bentonite powder.

Drilling and Installation Methods

Drilling Equipment

Boreholes for monitoring wells will be installed using direct-push (e.g. "Geoprobe") equipment unless field conditions dictate otherwise. The inside diameter of the rods should be at least 1 inch larger than the outside diameter of the well casing to allow room for a filter pack and grout seal to be installed through the rods.

Borehole Drilling

The borehole for the well casing will be drilled using direct push rods. No lubricants, circulating fluid, drilling muds, or other additives will be used during drilling.

During drilling, native soil samples will be retrieved in clear polybuterate sleeves within the direct-push rods. The collected samples will be logged according to soil type (Unified Soil Classification), moisture, and color. Selected samples may be submitted for chemical and physical analysis if called for in the work plan.

Once the borehole has been drilled to the desired depth, the subcontractor will prepare to install the well. The drill rods will remain in the ground to ensure stability of the borehole during well construction.

Well Casing Installation

Clean chemical-resistant gloves will be worn by drilling personnel while handling the well screen and casing. All lengths of well casing and screen will be measured and recorded in the field log book prior to well installation.

Filter Pack Installation

The filter sand pack will be installed by slowly pouring silica sand through the direct-push rods as they are slowly removed from the borehole. By this procedure, the rods act as a tremie pipe and will prevent sand from bridging inside the rods. The level of sand pack inside the annular space will be continuously monitored. As the rods are pulled upward, the sand settles out through the bottom and additional sand pack will be added at the surface. By adding sand pack this way, the borehole will remain open and free from cave-ins, and the well casing will remain centered within the sand pack and the borehole.

Bentonite Seal Installation

After the appropriate amount of sand pack has been added and its depth verified, the remaining annulus will be sealed with bentonite. Once the desired thickness of bentonite is in place, the bentonite will be allowed to settle for approximately 30 minutes. The thickness of the bentonite seal will be verified and subsequently hydrated using potable water.

Flush-Mount Completion

After the grout has cured, the PVC well casing will be cut so that it is approximately three inches below the ground surface. The top of the PVC well casing will be sealed with a locking expandable well cap, or PVC cap, and an 8-inch flush-mount well vault will be installed at the surface with cement. The cement surface surrounding the vault cover will be slightly mounded to cause surface water to drain away from the well so that the well vault will not fill with water

SOP 12
Groundwater Monitoring Well Sampling

Introduction

This SOP describes the equipment, criteria, and procedures that will be used to sample groundwater monitoring wells. Some deviations from this SOP may be necessary because of site-specific conditions.

Equipment

Below is a checklist of equipment for conducting groundwater sampling:

- Tools for opening well covers
- Keys to wells
- Water-level indicators
  - Dual-phase (if free product is suspected)
  - Single phase
- Positive displacement pump
- pH, conductivity, and temperature meters
- Standards for pH calibration
- In-line filters for metals samples
- Chemical resistant gloves
- Laboratory-supplied sample containers
- Iced cooler
- Field Notebook
- Chain of custody form
- Appropriate personal protection equipment according to HASP
- Photoionization detector (optional)
- Drum(s) for purge water containment
- Drum labels
- Permanent marker

Preliminaries

All equipment will be decontaminated as described in SOP 1 prior to mobilizing to the site. All equipment requiring calibration will be calibrated at the equipment warehouse prior to mobilizing to the field. The operating condition of pump will be checked prior to field mobilization.

Procedures

Upon arriving at each groundwater monitoring well, the well vault cover will be removed and the wellhead will be examined. Any signs of tampering will be recorded in the field logbook. The lock and well cap will then be removed from the well casing and depth to water and total depth will be measured.

Well Evacuation

To obtain a groundwater sample representative of natural aquifer conditions, at least three casing volumes will be evacuated from the well using a positive displacement pump. The

pump will be decontaminated prior to use as described in SOP 1. Evacuated groundwater will be poured into a graduated 5-gallon bucket to keep track of the purge volume. When the graduated bucket is full, the contents will be transferred into a 55-gallon drum. If the well does not recharge fast enough to permit the removal of three casing volumes, the well will be pumped dry and sampled as soon as it has sufficiently recharged.

Casing Volume Calculation

The well casing volume will be calculated to determine the purge volume required to obtain a groundwater sample representative of natural aquifer conditions. The following procedure will be used to calculate the total purge volume. Using the top of the north side of the inner well casing as a reference point, the depth to water (DTW) and total depth (TD) of the well will be measured using a water-level probe. The height of the water column will then be calculated by subtracting the depth to water from the total depth of the well (TD - DTW). Equation (1) below is used to calculate volume constants for wells with various casing sizes.

Well Casing Volume = π (Casing Radius)2 (7.48 gal/ft3) (1)

where Casing Radius = the radius of the well casing in feet
7.48 gal/ft3 = volume conversion constant
π = constant = 3.14

For a 2-inch diameter well casing: Casing Volume = (TD-DTW feet) (0.16 gallons/foot)
Total Purge Volume = Casing Volume x 3

For a 4-inch diameter well casing: Casing Volume = (TD-DTW feet) (0.65 gallons/foot)
Total Purge Volume = Casing Volume x 3

Stabilization Parameters

Groundwater stabilization parameters pH, temperature, and specific conductivity will be monitored during well purging to verify when the aquifer has stabilized and groundwater sampling can commence. Stabilization parameters will be measured at least four times; once every casing volume and immediately before sampling. All stabilization parameter measurements will be recorded in the field log book. The following guidelines are acceptable ranges for stabilization parameters:

- pH readings are consistently within 0.2 pH units;
- temperature is within 0.5˚C of the last reading;
- conductivity is within 10 percent of the last reading.

Groundwater Sample Collection

A complete set of laboratory-supplied sample containers will be prepared and labeled prior to collecting groundwater samples. A disposable bailer or low-flow peristaltic pump will be used to obtain groundwater samples by the following analyte order in the appropriate pre-preserved sample containers:

1) VOCs including BTEXN;
2) Semi-VOCs;
3) Total Petroleum Hydrocarbons;
4) Oil and Grease/TRPH;
5) Filtered metals.

All 40-milliliter containers will be filled so that no headspace is present in the container after the lid has been fastened. Groundwater samples collected for metals analysis will be filtered using inline filters attached to the outlet tubing of a peristaltic pump or with a Nalgene™ hand-pump filter press. The labels for each groundwater sample will be double-checked and immediately placed in an iced cooler to maintain a temperature of 4˚C.

Purge Water Containment And Disposal

Purge water will be contained in labeled 55-gallon drums and stored onsite. At a minimum, drum labels will contain the following information:

- Site Identification
- Monitoring Well Identification
- Volume (Gallons) of Purge Water
- IHI Environmental
- IHI Project Manager
- 640 East Wilmington Avenue
- Salt Lake City, UT 84106
- 801-466-2223

The final disposition of the purge water will depend on groundwater analytical results and contract specifications.

Decontamination

All sampling equipment will be decontaminated according to SOP 1 before mobilizing to the site. If more than one well will be sampled, sampling equipment must be decontaminated between wells.

Demobilization

After well sampling has been completed and all equipment has been decontaminated, each well will be capped and secured. Damaged equipment will be noted in the field logbook and labeled on the instrument.

SOP 13
FIELD INSTRUMENT CALIBRATION

Introduction

This SOP describes the procedures for the use and calibration of the most commonly used field instruments. The use and calibration procedures are provided for the following field instruments:

- Photoionization detector/organic vapor monitor (PID/OVM)
- Niton XRF

Photoionization Detector

- Photoionization detector meter and filter screen
- Isobutylene span gas (100 ppm) and gas sample bag

Calibration Procedures

Calibration procedures will be performed, as specified by the manufacturer, each day prior to use.

Niton XRF

- XRF

Calibration Procedures

Calibration procedures will be performed, as specified by the manufacturer, each day prior to use and following the QA/QC requirement listed in the EPA Method 6200 requirements.

Preliminaries

All equipment will be decontaminated as described in SOP 17 prior to mobilizing to the site. To enhance instrument life and performance, the instrument should be allowed to completely discharge and be fully recharged the evening prior to fieldwork.

Calibration Procedures

Instrument calibration should be conducted prior to any field use of the instrument, following the manufacturer's recommended procedures. Copies of the calibration procedures will be kept in the equipment's storage case in the field.

SOP 17
EQUIPMENT DECONTAMINATION

In order to reduce the risk of transferring contaminants from areas of known contamination to known clean areas, decontamination of personnel and equipment is required. A description of site area contamination zones was presented in the previous section. The decontamination procedures shall be established for each site based on the degree of hazard associated with the site and the amount of contact with hazardous materials resulting from site work. Final decontamination procedures shall be reviewed and approved by the Site Safety and Health Manager. This procedure contains general decontamination protocols, suitable for most sites, although decontamination procedures will be reviewed on a site-by-site, contaminant-by-contaminant basis.

Decontamination Guidelines

IHI uses a four-step decontamination procedure described below:

Step 1 Gross Contaminant Removal

This step consists of a scrubbing using a detergent solution and water and a stiff brush. Scrubbing will continue until visible contaminants are removed. The water will be changed as necessary, daily at a minimum.

Step 2 Alconox Wash

An Alconox wash will be prepared by mixing 1 to 1-½ tablespoons of Alconox per gallon of warm water. The water will be changed as necessary, daily at a minimum.

Step 3 Clear Water Rinse

A rinse with clear potable water. This water will be changed as necessary to ensure its purity, daily at a minimum.

Step 4 Distilled Water Rinse

Unused distilled water will be used as a final rinse for all decontamination procedures. The water may be poured or sprayed.

Decontamination Blanks to document the decontamination procedures will be collected if required in the SAP.

SOP 20
SAMPLE HANDLING AND DOCUMENTATION

Introduction

This SOP describes procedures to follow once soil, sediment or water samples are collected to ensure that the samples are handled properly and that appropriate documentation is completed.

Sample Handling

Chemical resistant gloves will be worn during collection and initial handling of all samples. All samples will be promptly placed in an iced cooler to maintain a temperature of 4°C. Typically, samples selected for chemical analysis are delivered at the end of each day to the analytical laboratory. If they are not submitted to the laboratory on the same day collected, they will be stored in a refrigerator in a locked sample storage room at IHI's office until transport and delivery to the laboratory in an iced cooler. Upon receipt of the samples, the laboratory will record the internal temperature of the sample transport coolers on the chain of custody record.

Documentation

Sample Identification and Labeling
Samples will be labeled following the specific labeling requirements set forth in the sampling plan or using labeling methods that identify the area from which they were collected and the depth.

Each sample sleeve or sample container will be immediately labeled with the following information:

- Project name
- Project number
- Sample identification
- Sample depth
- Date and time collected
- Analyses requested
- Filtered or unfiltered (for water samples)
- Sampler's initials

This information will also be recorded in the field notebook. An example sample label is provided as an attachment to this SOP

Chain of Custody
Chain of custody documentation will begin in the field for each sample submitted to the laboratory and will be maintained by laboratory personnel. Samples will remain in the possession of the sampler at all times, or in a locked facility until delivery to the analytical laboratory. A chain of custody form will be completed and will accompany each sample cooler to the analytical laboratory. An example chain of custody form is provided as an attachment to this SOP.

Field Book

IHI Environmental field personnel will maintain a field log book to record all field activities. The field logbook will be a weather-resistant bound survey-type field book. All data generated during the project and any comments or other notes will be entered directly into the field logbook.

Example Sample Label:

Prepared by Environmental Science Corp.

Project: _____

Proj #: _____

Sample Location/ID: _____

Analysis Reqd: _____

_____

Date: _____ Time: _____

Example Chain of Custody Form:

Company Name/Address:
Terracon - Draper

640 E Wilmington Avenue
Salt Lake City,UT 84106

Billing Information:

Accounts Payable
640 E Wilmington Avenue

Salt Lake City,UT 84106

Analysis/Container/Preservative

Chain of Custody
Page ___ of ___

ESC LAB SCIENCES
12065 Lebanon Road
Mt. Juliet, TN 37122

Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859

Report to:

Email to:

Project Description:

City/State Collected

Phone:
FAX:

Client Project #:

ESC Key:

Collected by: (print)

Site/Facility ID#:

P.O.#:

Collected by (signature):

Immediately Packed on Ice N ___ Y

Rush? (Lab MUST Be Notified)
___ Same Day..... 200%
___ Next Day..... 100%
___ Two Day..... 50%
___ Three Day..... 25%

Date Results Needed:

Email? __No __Yes
FAX? __No __Yes

No. of Cntrs

CoCode TERRDUT (lab use only)
Template/Prelogin

Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	Remarks/Contaminant	Sample # (lab only)

EXAMPLE CHAIN OF CUSTODY FORM

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Remarks:

Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____	Condition: (lab use only)	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp:	Bottles Received:	CoC Seals Intact ___ Y ___ N ___ NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date:	Time:	pH Checked: NCF:

SOP 39
NITON XRF FIELD SCREENING

Introduction

This SOP describes one procedure used for screening soils or sediments for heavy metals. Samples may be collected with a decontaminated hand tools or drive barrel.

Equipment

- Niton XRF
- Resealable plastic bags
- Log Forms/Field Notebook

Preliminaries

Soil sample locations will be determined from the project-specific work plan.

Procedures

In-Situ Screening Procedure

Secure faceplate to the XRF. Set on the ground at a 30 to 60 degree angle. Pull trigger until XRF beeps. XRF will be set to analyze for a pre-set amount of time. To change length of analysis time, see manufacturer's instructions. The amount of time the XRF requires to analyze the sample will vary, depending on the current age of the source.

Ex-Situ Screening Procedure

Soils or sediments to be screened ex-situ will be collected in new, thin, resealable plastic bags (do not use freezer bags or thick plastic bags) labeled with the sample name, date and time of collection, IHI's project number, and the sampler's initials. Sufficient soils or sediments to fill approximately one-third to one-half of a gallon bag will be collected from each location. New latex or nitrile sampling gloves will be worn for each sample during collection and handling. The soils or sediments will be homogenized inside the bag by gloved hand, so that the XRF analyses represent the average concentrations of metals in the sample.

Once homogenized, the XRF will be used to screen the sample either through Niton-supplied thin plastic sample bags or using Niton-supplied sample cups.

- **Niton-supplied plastic bag:** Fill three new sample bags from the resealable homogenized bag. Remove the foam cup holder from the XRF sample tray and slide one of the sample bags into place. Set the XRF into the stand and depress the main trigger. After the pre-set sampling time, the XRF will beep and display the reading. Repeat with each of the three sample bags. The average of the three final readings will be used as the representative concentration. An alternative to using the Niton-supplied sample bags is to place the XRF directly on the homogenized resealable bag in three separate locations and take the readings directly.
- **Niton-supplied sample cup:** Prepare a sample cup by placing the bottom cap (cap with two or three holes) under the cylinder, then fill the cylinder with soil from the

homogenized sample. Place the Niton-supplied plastic film tightly over the soil, and then place the top cap. Ensure that cap is placed tightly over sample. Place the sample cup in the manufacturer-provided tray and the XRF in the stand. Depress the main trigger. After the pre-set sampling time, the XRF beep and will display the reading.

Screening procedures should follow EPA Method 6200:

FIELD PORTABLE X-RAY FLUORESCENCE SPECTROMETRY FOR THE DETERMINATION OF ELEMENTAL CONCENTRATIONS IN SOIL AND SEDIMENT

IHI ENVIRONMENTAL

Groundwater Sample Quality Control Log

(Gallons/Casing Volumes)
Version Date 2010.01.01

Project #: _____ Project Name: _____
Sample ID: _____ Sample Location: _____
Sample Date: _____ Sample Time: _____ Sampler's Name: _____

Equipment Decontamination

Equipment	Decontaminated prior to use?	Decontamination Method
	Yes No	
	Yes No	
	Yes No	

Well Measurements

Casing Diameter (inches): _____ Casing Elevation Reference Point: _____
Depth to Product (DTP; ft): _____ Thickness of Product (DTW – DTP; ft): _____
Depth to Water (DTW; ft): _____ Length of Water in Well (TD – DTW; ft): _____
Total Depth of Well (TD; ft): _____

Casing Volume Calculations

$Well\ casing\ volume\ (gal) = \left(Unit\ Casing\ Volume\ {}^{gal}/_{ft}\right)\left(\begin{matrix}length\ of\\ water\ in\ well\end{matrix}\ (ft)\right) =$ _____

$Three\ Casing\ Volumes\ (gal) = (3)(Well\ Casing\ Volume\ (gal)) =$ _____

Casing Diameter (in)	1	1.5	2	4	6	8
Unit Casing Volume (gal/ft)	0.04	0.1	0.16	0.65	1.5	2.6

Conversions:	1 gallon = 3.8 L	1 L = 1.057 quarts
	1 ft^3 = 7.48 gallons	1 L = 1000 mL

Water Quality Parameters

Purging Start Time: _____ Purging End Time: _____ Total Purge Time: _____ Purged dry? Y N

Time	**Purge Volume** (L) **or** (gallons)	**Temp.** (°C) **or** (°F)	**Conductivity** (mS/cm)	**D.O.** (mg/L)	**pH**	**ORP** (mV)	**Water Description** (color, odor, sheen, etc.)

Sample Information

Container (type and volume)	**Supplied by lab?**		**Preserved?**		**Field Filtered?**		**Analyses Requested**
	Y	N	Y	N	Y	N	
	Y	N	Y	N	Y	N	
	Y	N	Y	N	Y	N	

IHI ENVIRONMENTAL

Depth-to-Product, Depth-to-Water, and Total Well Depth Log

Version Date 2010.01.01

Project #: _____ **Project Name:** _____

Well ID / Piezometer ID	Date	Time	Measurements			Calculations	
			Depth to Product (DTP; ft)	Depth to Water (DTW; ft)	Total Depth of Well (TD; ft)	Thickness of Product (DTW - DTP; ft)	Length of Water in Well (TD - DTW; ft)

640 EAST WILMINGTON AVE SALT LAKE CITY UT 84106 TELEPHONE: 801-466-2223 FAX: 801-466-9616 E-MAIL: IHI@IHI-ENV.COM

SALT LAKE CITY SAN FRANCISCO PHOENIX DENVER SEATTLE

Borehole Log

Boring No.:

Project No.:
Project Name:
Drilling Method:
Drilling Contractor:
Geologist:
Location:

Date:
Start Time:

Field Book No.:
End Time:

Water Level Measurements (bgs)

Date:	**Date:**
Time:	**Time:**
Depth (ft):	**Depth (ft):**

Depth (ft)	Drive	PID (ppm)	Lithology	SUBSURFACE PROFILE	SAMPLE INFORMATION	
				Soil Description	Sample ID	Analysis
5						
10						
15						
20						

2015a *Terracon Consultants, Inc., 2015. Phase I Environmental Site Assessment, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County, Utah, EPA Cooperative Agreement No. 96809201, Hazardous Substance Grant for Redevelopment Agency of Salt Lake City.* Terracon Project No. AL157312. Dated August 31, 2015.

Phase I Environmental Site Assessment

Schovaers Electronics

22 South Jeremy Street

Salt Lake City, Salt Lake County, Utah

August 31, 2015

Terracon Project No. AL157312

EPA Cooperative Agreement #96809601

Hazardous Substance Grant for Redevelopment Agency of Salt Lake City

Prepared for:

Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

Prepared by:

Terracon Consultants, Inc.
Salt Lake City, Utah

August 31, 2015

Redevelopment Agency of Salt Lake City
P.O. Box 145518
Salt Lake City, Utah 84114

Attn: Ms. Ashlie Easterling
P: (801) 535-7244
E: ashlie.easterling@slcgov.com

Re: Phase I Environmental Site Assessment
Schovaers Electronics
22 South Jeremy Street, Salt Lake City, Utah
Terracon Project No. AL157312
EPA Cooperative Agreement #96809201

Dear Ms. Easterling:

Terracon Consultants, Inc. (Terracon) is pleased to submit the enclosed Phase I Environmental Site Assessment (ESA) report for the above-referenced site. This assessment was performed in accordance with Terracon Proposal No. PAL150187, dated April 17, 2015. This assessment was conducted under EPA Cooperative Agreement #96809201 for the Hazardous Substance Grant. EPA approved this property for assessment on the basis of written approval of Property Profile Form, dated February 6, 2015. This ESA is provided as part of Task 4 of the Cooperative Agreement Work Plan digitally approved by EPA on July 30, 2015.

We appreciate the opportunity to be of service to you on this project. In addition to Phase I services, our professionals provide geotechnical, environmental, construction materials, and facilities services. If there are any questions regarding this report or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,
Terracon Consultants, Inc.

Ashley A. Scothern, E.P.
Staff Environmental Scientist

Kent Wheeler, APR
Regional Manager

Attachments

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APPENDICES

EXECUTIVE SUMMARY

This Phase I Environmental Site Assessment (ESA) was performed in accordance with Terracon Proposal No. PAL150187, dated April 17, 2015, and was conducted consistent with the procedures included in ASTM E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. The ESA was conducted under the supervision or responsible charge of Ashley A. Scothern, Environmental Professional. Ms. Scothern performed the site reconnaissance on May 1, 2015.

Findings

A summary of findings is provided below. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein.

Site Description and Use

The site is an approximately 0.34-acre parcel (Parcel ID #15-02-204-007) owned by Schovaers Electronics. An approximately 6,000-square-foot industrial building occupies the site. An approximately 400-square-foot garage is present on the northwest side of the site. Paved parking areas are located to the east and north of the building. A small weedy area is present on the western boundary area. Schovaers Electronics currently occupies the site.

The facility consists of a photo room, film tooling room, rout room, drill room, and plating room storage areas, and small office areas. The facility makes circuit boards using a plating operation. During the plating process, thin layers of metal are either adhered to or stripped away from the circuit boards.

The plating tanks are mixed and drained in the plating room. Overflow water from the plating tanks drains directly on the wooden pallet flooring in the room, which is collected by the sump in the room. The sump is located next to the wastewater treatment system in the southeast corner of the plating room. The wastewater is treated then discharged into the sanitary sewer system. Historically, etchant from the plating room was observed to have leaked out of the building through the building's seams and concrete flooring. Because of this, a liner was installed above the concrete slab in the plating room for more efficient discharge of overflow water into the sump.

Historical Information

The site was residential from at least 1898 to the mid-1900s. The residences were demolished and the current commercial building was constructed by 1962. The site building was originally occupied by an electrical supply company and then a wholesale upholstery business before Schovaers occupied the building in 1977. Use of the site as an electroplating facility for the past 38 years represents a REC to the site.

Records Review

The site was identified as the Schovaers Electronics RCRA-SQG facility. This listing does not represent a REC to the site.

The north-adjoining facility was listed as the Crown Plating Company, Inc. RCRA-SQG, FTTS, FINDS and UT NPDES facility. Based on numerous violations in the mid-1980s to early 1990s due to the known improper disposal of 1,1,1, trichlororethane (TCA) on the property boundary, this RCRA-SQG listing represents a REC to the site.

Multiple other facilities were noted; however, the remaining facilities do not represent a REC to the site. Refer to Section 4.1 for more detailed information regarding the findings.

Site Reconnaissance

Numerous RECs were identified during site inspection. The site has been used as an electroplating facility for over 35 years. Based on the age of the wastewater treatment system, which includes the sump, and the visible seepage of spent etchant through the exterior walls and unknown seepage toward ground level, the electroplating operations at the site represent a REC.

Adjoining Properties

The site is adjoined to the north by an electroplating facility, to the east by a stone facility, and to the south by a vehicle repair shop. An industrial warehouse adjoins the site to the west. Indications of RECs were not observed with the adjoining properties.

Opinions and Conclusions

We have performed a Phase I ESA consistent with the procedures included in ASTM Practice E1527-13 at 22 South Jeremy Street, Salt Lake City, Salt Lake County, Utah, the site. The following Recognized Environmental Conditions (RECs) or Controlled RECs were identified in connection with the site:

- **Impacts from adjoin properties:** The north adjacent property has documented improper disposal of TCA very near or on the property line. This identified release represents a REC to the subject property.

- **Long-term industrial use:** The site has been an electroplating shop for approximately 38 years. Evidences of releases from these industrial operations were widespread and included leaking and spilling. Below, we have listed observed RECs that are considered part of the long-term industrial use.

REC/CREC/HREC	Petroleum	Hazardous Substances	Potentially Combined
Historical use of the site as a plating shop (38 years)		X	
Historical solvent use		X	
RCRA hazardous waste storage and disposal		X	
Wastewater discharge / Sump system		X	
Exterior staining associated with drum storage		X	
Poor storage of hazardous materials and wastes		X	

Recommendations

Based on the scope of services, limitations, and conclusions of this assessment, Terracon recommends the following additional actions.

- A subsurface investigation to determine if the identified REC has impacted the soils or groundwater at the site.

1.0 INTRODUCTION

1.1 Site Description

Site Name	Schovaers Electronics
Site Location/Address	22 South Jeremy Street, Salt Lake City, County, Utah
Land Area	Approximately 0.34 acres
Site Improvements	One approximately 6,000-square-foot warehouse building and one approximately 200-square-foot lean to shed.

The site location is depicted on Exhibit 1 of Appendix A, which was reproduced from a portion of the USGS 7.5-minute series topographic map. A Site Diagram of the site and adjoining properties is included as Exhibit 2 of Appendix A. Acronyms and terms used in this report are described in Appendix F.

1.2 Scope of Services

This Phase I ESA was performed in accordance with our Terracon Proposal No. APL150187, dated April 17, 2015, and was conducted consistent with the procedures included in ASTM E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. The purpose of this ESA was to assist the client in developing information to identify RECs in connection with the site as reflected by the scope of this report. This purpose was undertaken through user-provided information, a regulatory database review, historical and physical records review, interviews, including local government inquiries, as applicable, user-provided information, and a visual noninvasive reconnaissance of the site and adjoining properties. Limitations, ASTM deviations, and significant data gaps (if identified) are noted in the applicable sections of the report.

Services in support of client Brownfields revitalization are provided considering client's previously EPA-approved Brownfield Cooperative Agreement and Cooperative Agreement Work Plan. ESA services also consider EPA's *All Appropriate Inquiries Rule: Reporting Requirements Checklist for Assessment Grant Recipients* (EPA 560-R-11-030, February 2014).

1.3 Standard of Care

This ESA was performed in accordance with generally accepted practices of this profession, undertaken in similar studies at the same time and in the same geographical area. We have endeavored to meet this standard of care, but may be limited by conditions encountered during performance, a client-driven scope of work, or inability to review information not received by the

report date. Where appropriate, these limitations are discussed in the text of the report, and an evaluation of their significance with respect to our findings has been conducted.

Phase I ESAs, such as the one performed at this site, are of limited scope, are noninvasive, and cannot eliminate the potential that hazardous, toxic, or petroleum substances are present or have been released at the site beyond what is identified by the limited scope of this ESA. In conducting the limited scope of services described herein, certain sources of information and public records were not reviewed. It should be recognized that environmental concerns may be documented in public records that were not reviewed. No ESA can wholly eliminate uncertainty regarding the potential for RECs in connection with a property. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for RECs. No warranties, express or implied, are intended or made. The limitations herein must be considered when the user of this report formulates opinions as to risks associated with the site or otherwise uses the report for any other purpose. These risks may be further evaluated – but not eliminated – through additional research or assessment. We will, upon request, advise you of additional research or assessment options that may be available and associated costs.

1.4 Additional Scope Limitations, ASTM Deviations and Data Gaps

Based upon the agreed-on scope of services, this ESA did not include subsurface or other invasive assessments, vapor intrusion assessments or indoor air quality assessments (i.e. evaluation of the presence of vapors within a building structure), business environmental risk evaluations, or other services not particularly identified and discussed herein. Credentials of the company (Statement of Qualifications) have not been included in this report but are available upon request. Pertinent documents are referred to in the text of this report, and a separate reference section has not been included. Reasonable attempts were made to obtain information within the scope and time constraints set forth by the client; however, in some instances, information requested is not, or was not, received by the issuance date of the report. Information obtained for this ESA was received from several sources that we believe to be reliable; nonetheless, the authenticity or reliability of these sources cannot and is not warranted hereunder. This ESA was further limited by:

- The historical use of the site was not identified back to when the site was undeveloped, as the earliest ascertainable standard historical source identified the site as developed with residences in 1898. Based on the original non-suspect residential development of the site, this data gap is not deemed to be significant.

An evaluation of the significance of limitations and missing information with respect to our findings has been conducted, and where appropriate, significant data gaps are identified and discussed in the text of the report. However, it should be recognized that an evaluation of significant data gaps is based on the information available at the time of report issuance, and an

evaluation of information received after the report issuance date may result in an alteration of our conclusions, recommendations, or opinions. We have no obligation to provide information obtained or discovered by us after the issuance date of the report, or to perform any additional services, regardless of whether the information would affect any conclusions, recommendations, or opinions in the report. This disclaimer specifically applies to any information that has not been provided by the client.

This report represents our service to you as of the report date and constitutes our final document; its text may not be altered after final issuance. Findings in this report are based upon the site's current utilization, information derived from the most recent reconnaissance and from other activities described herein; such information is subject to change. Certain indicators of the presence of hazardous substances or petroleum products may have been latent, inaccessible, unobservable, or not present during the most recent reconnaissance and may subsequently become observable (such as after site renovation or development). Further, these services are not to be construed as legal interpretation or advice.

1.5 Reliance

This ESA report is prepared for the exclusive use and reliance of Redevelopment Agency of Salt Lake City (RDA). General public use of the document or its information is at the user's risk. Reliance by any other party is prohibited without the written authorization of Redevelopment Agency of Salt Lake City and Terracon Consultants, Inc. (Terracon).

Reliance on the ESA by the client and all authorized parties will be subject to the terms, conditions and limitations stated in the proposal, ESA report, and Terracon's Agreement. The limitation of liability defined in the Agreement is the aggregate limit of Terracon's liability to the client and all relying parties.

Continued viability of this report is subject to ASTM E1527-13 Sections 4.6 and 4.8. If the ESA will be used by a different user (third party) than the user for whom the ESA was originally prepared, the third party must also satisfy the user's responsibilities in Section 6 of ASTM E1527-13.

1.6 Client Provided Information

Prior to the site visit, Ms. Ashlie Easterling, RDA's representative, was asked to provide the following user questionnaire information as described in ASTM E1527-13 Section 6.

Client Questionnaire Responses

Client Questionnaire Item	Client Did Not Respond	Client's Response	
		Yes	No
Specialized Knowledge or Experience that is material to a REC in connection with the site.			X
Actual Knowledge of Environmental Liens or Activity Use Limitations (AULs) that may encumber the site.			X
Actual Knowledge of a Lower Purchase Price because contamination is known or believed to be present at the site.			N/A*
Commonly Known or Reasonably Ascertainable Information that is material to a REC in connection with the site.		X	
Obvious Indicators of Contamination at the site.		X	

* The client is not currently purchasing the property, but providing assessment as recipient of an EPA Brownfield Assessment Cooperative Agreement. This is consistent with eligible use of funding by cooperative agreement recipients to provide assessment services on eligible properties to promote Brownfields revitalization where real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Ms. Easterling stated that prior to a foundation liner being installed in the 1980s, possible leaking of acids into cracked concrete may have occurred. She also stated that the site is a small quantity generator due to the generation of filter cakes. A copy of the completed User Questionnaire is attached in Appendix C.

2.0 PHYSICAL SETTING

Physical Setting

Physical Setting Information		Source
Topography (Refer to Appendix A for an excerpt of the Topographic Map)		
Site Elevation	Approximately 4,230 feet (NGVD)	USGS Topographic Map, Salt Lake City, North, Utah Quadrangle, 1963, photo-revised in 1969 and 1975
Surface Runoff/ Topographic Gradient	Surface runoff and topographic gradient at the site is relatively flat.	
Closest Surface Water	The Jordan River is approximately 0.53 miles west of the site.	
Soil Characteristics		
Soil Type	UL – Urban Land	Web Soil Survey http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm
Description	Fill	
Geology/Hydrogeology		
Formation	Qtg – Terrace Gravels	Utah Geological Survey http://geology.utah.gov/apps/intgeomap/index.html
Description	Pebble and cobble gravel, sand and silt occurring a few to several tens of meters above modern flood plains.	
Estimated Depth to	Approximately 8 to 10 feet below ground	DERR Interactive Map

Physical Setting Information		Source
First Occurrence of Groundwater	surface	http://enviro.deq.utah.gov/ Bullough LUST (Facility ID #4001968) and Calder LUST (Facility ID #4000119)
*Hydrogeologic Gradient	Based on Terracon's knowledge of the area, groundwater is generally less than 10 feet below the surface, and flows to the west if it is not influence by anthropological sources.	

* The groundwater flow direction and the depth to shallow, unconfined groundwater, if present, would likely vary depending upon seasonal variations in rainfall and other hydrogeological features. Without the benefit of on-site groundwater monitoring wells surveyed to a datum, groundwater depth and flow direction beneath the site cannot be directly ascertained.

3.0 HISTORICAL USE INFORMATION

Terracon reviewed the following historical sources to develop a history of the previous uses of the site and surrounding area, in order to help identify past uses for indications of RECs. Copies of selected historical documents are included in Appendix C.

3.1 Historical Topographic Maps, Aerial Photographs, Sanborn Maps

Readily available historical USGS topographic maps, selected historical aerial photographs (at approximately 10 to 15 year intervals) and historical fire insurance maps produced by the Sanborn Map Company were reviewed to evaluate land development and obtain information concerning the history of development on and near the site. Reviewed historical topographic maps, aerial photographs and Sanborn Maps are summarized below.

Historical fire insurance maps produced by the Sanborn Map Company were requested from EDR to evaluate past uses and relevant characteristics of the site and surrounding properties. EDR provided Sanborn maps as summarized below.

- Topographic map: Salt Lake City North, Utah, published in 1963 from **1962** aerial photographs; photo-revised in 1969 and 1975 from **1969** and **1975** aerial photographs (1:24,000)
- Topographic map: Salt Lake City North, Utah, published in 1998 from **1997** aerial photographs
- Aerial photograph: GeoSearch, **1937, 1946, 1950, 1962, 1977, 1981, 1993, 1997, 2003,** and **2014**; all photographs were scaled to 1"=500'. / Google Earth Historical Aerials, 2006, interactive scale
- Sanborn Fire Insurance Map(s): **1898, 1911, 1949, 1950, 1986**
- Previous Phase I ESA, Wasatch Environmental, June 2010

Historical Topographic Maps, Aerial Photographs and Sanborn Maps

Direction	Description
Site	Residential development is visible (1898-1911). The site is vacant (1949-1950). The current warehouse building occupies the site (1962-1977). A rail spur is visible along the southern section of the site, which terminates at the west boundary area of the site (1986-2009). The site is visible with the current warehouse and removed rail spur (2014).
North	The property appears undeveloped (1898). The property appears residential (1911-1962). The south section of the warehouse is present (1977). The warehouse is expanded northward, comprising the current building configuration (1986-2014).
East	Jeremy Street and undeveloped property is visible (1898-1962). Due east of the site, undeveloped property is visible. Northeast of the site, the current stone facility building is visible (1962-1981). Some small exterior storage is visible in the undeveloped area of the property. The current commercial building is still present (1993-2003). The property appears to be used as an exterior storage yard of stone and other products associated with the building north of the yard (2006-2014).
South	Residential property occupies the south-adjoining property (1898). A railroad line is present. Residential property is visible south of the rail line (1911). Vacant property is visible south of the rail line (1949-1950). The rail line and residential property are visible (1962). The rail line and commercial buildings are visible (1977-2006). The rail line appears removed, and a vacant strip of property is visible, with commercial buildings present to the south (2014).
West	Residential property is present to the west (1898-1911). The property appears vacant (1949-1962). A commercial building occupies the property (1977-2014).

3.2 Historical City Directories

The R. L. Polk City Directories used in this study were made available through the Salt Lake City Public Library (selected years reviewed: 1946, 1952, 1957, 1962, 1967, 1972, 1977, 1982, 1987, 1993, 1999, 2005, 2009, and 2015) and were reviewed at approximate five-year intervals, if readily available. Since these references are copyright protected, reproductions are not provided in this report. The current street address for the site was identified as 22 South Jeremy Street.

Historical City Directories

Direction	Description
Site	No listing (1946-1952). General Cable Corporation, electrical supplies (1962-1972). Keyston Brothers, wholesale upholstery (1977). Bob Schovaers Tactile Signs 7 Engraving (1999). Schovaers Electronics Corporation (1982, 1993, 2005-2015).
North	**8 and 14 South Jeremy Street** – No listing (1946-1962). Crown Plating Inc. (1967-1982,

Direction	Description
	1993-2015).
East	**15 South Jeremy Street** – No listing (1946-1957). Greater Mountain Chemical Company of Utah (1962-1972). The Soap Company (1977). Creed Laboratories (1982). Chembrite, chemical products (1993-1999). No listing (2005). Alexander Clark Enterprises, ornamental metal work (2009-2015).
South	**42 South Jeremy Street** – Residential, sheet metal worker (1946-1952). Residential (1957). Rainbow Sales Company, janitorial supplies (1962). Western Broom Company (1967-1972). Laundry Equipment Parts, electrical repair (1977-1982, 1993-1999). Residential (2009). No listing (2005, 2015).
West	**25 South 900 West** – No listing (1946-1967). Continental Industries of Utah carpet (1972). Indico Distributing, floor coverings (1977). Utah Paperbox Company (1993). Uinta Urethane Recyclers (2005). EPC International/Uinta Urethane Recyclers (2009). No listing (1999, 2015).

3.3 Site Ownership

Based on a review of information obtained from the Salt Lake County Assessor's records, the current site owner is Schovaers Electronics Corporation.

3.4 Title Search

At the direction of the client, a title search was not included as part of the scope of services. Unless notified otherwise, we assume that the client is evaluating this information outside the scope of this report.

3.5 Environmental Liens and Activity and Use Limitations

Environmental lien and activity and use limitation records recorded against the site were not provided by the client. At the direction of the client, performance of a review of these records was not included as part of the scope of services and unless notified otherwise, we assume that the client is evaluating this information outside the scope of this report.

The client provided a copy of the Commitment for Title Insurance (CTI). A copy of the CTI is provided in Appendix C. No environmental liens or Activity and Use Limitations were noted.

3.6 Interviews Regarding Current and Historical Site Uses

The following individuals were interviewed regarding the current and historical use of the site.

Interviewees

Interviewer	Interviewee/Phone #	Title	Date/Time
Ashley Scothern	Mr. Bob Schovaers (801) 521-2668	Owner/Owner Representative	April 30 and May 1, 2015

Mr. Schovaers informed Terracon of the following details that occur at the site during daily work activities:

- Daily operations are the manufacturing of electronic circuit boards
- Hazardous materials in quantities greater than 5 gallons are stored and used at the site (such as caustic soda, flux, copper etchant, nitric acid, etc.)
- There are floor drains and a sump system that discharges to an on-site wastewater treatment facility before discharging into the municipal waste system.
- Mr. Schovaers stated the site has a Spill Prevention Plan; however, upon review of Mr. Schovaers' files, the plan is internal and not a required SPPC Plan.
- During the interview process, Mr. Schovaers stated that toluene was historically used at the site for approximately 10 years, starting in 1977.

Mr. Schovaer was not aware of any pending, threatened or past environmental litigation, proceedings or notices of possible violations of environmental laws or liability or potential environmental concerns in connection with the site.

3.7 Prior Report Review

Terracon requested the client provide any previous environmental reports they are aware of for the site. Previous reports were provided by the client to Terracon for review.

- Phase I Environmental Site Assessment, Salt Lake Redevelopment Agency Blight Study, North Temple Street Corridor, Blight Study Area N4
  South Temple to 100 South and 800 West to 900 West, Salt Lake City, Utah
  Dated: June 21, 2010
  Prepared by: Wasatch Environmental, Inc.
  For: Lewis Young Robertson & Burningham, Inc.

The Wasatch Environmental Phase I ESA was conducted on an area known as N4 that included, but was not limited to, the site. Information pertaining to the site has been incorporated into relevant sections of this report; however, as the report was for a much larger area, details specific to the subject property are limited. An abridged copy of the Phase I ESA is provided in Appendix C.

4.0 RECORDS REVIEW

Regulatory database information was provided by EDR, a contract information services company. The purpose of the records review was to identify RECs in connection with the site. Information in this section is subject to the accuracy of the data provided by the information services company and the date at which the information is updated, and the scope herein did not include confirmation of facilities listed as "unmappable" by regulatory databases.

In some of the following subsections, the words up-gradient, cross-gradient and down-gradient refer to the topographic gradient in relation to the site. As stated previously, the groundwater flow direction and the depth to shallow groundwater, if present, would likely vary depending upon seasonal variations in rainfall and the depth to the soil/bedrock interface. Without the benefit of on-site groundwater monitoring wells surveyed to a datum, groundwater depth and flow direction beneath the site cannot be directly ascertained.

4.1 Federal and State/Tribal Databases

Listed below are the facility listings identified on federal and state/tribal databases within the ASTM-required search distances from the approximate site boundaries. Database definition, descriptions, and the database search report are included in Appendix D.

Federal Databases

Database	Description	Radius (miles)	Listings
CERCLIS	The CERCLIS database is a compilation of facilities which the EPA has investigated or is currently investigating for a release or threatened release of hazardous substances pursuant to the CERCLA of 1980.	0.5	1
CERCLIS / NFRAP	CERCLIS/NFRAP refers to facilities that have been removed and archived from EPA's inventory of CERCLA sites.	0.5	2
ERNS	The Emergency Response Notification System (ERNS) is a listing compiled by the EPA on reported releases of petroleum and hazardous substances to the air, soil and/or water.	Site	
IC / EC	A listing of sites with institutional and/or engineering controls in place. IC include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls. EC include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.	Site	1

Database	Description	Radius (miles)	Listings
NPL	The NPL is the EPA's database of uncontrolled or abandoned hazardous waste facilities that have been listed for priority remedial actions under the Superfund Program.	1	1
NPL (Delisted)	The NPL (Delisted) refers to facilities that have been removed from the NPL.	0.5	0
RCRA CORRACTS/ TSD	The EPA maintains a database of RCRA facilities associated with treatment, storage, and disposal (TSD) of hazardous waste that are undergoing "corrective action." A "corrective action" order is issued when there has been a release of hazardous waste or constituents into the environment from a RCRA facility.	1	2
RCRA Generators	The RCRA Generators database, maintained by the EPA, lists facilities that generate hazardous waste as part of their normal business practices. Generators are listed as either large (LQG), small (SQG), or conditionally exempt (CESQG). LQG produce at least 1000 kg/month of non-acutely hazardous waste or 1 kg/month of acutely hazardous waste. SQG produce 100-1000 kg/month of non-acutely hazardous waste. CESQG are those that generate less than 100 kg/month of non-acutely hazardous waste.	Site and adjoining properties	2
RCRA Non-CORRACTS/ TSD	The RCRA Non-CORRACTS/TSD Database is a compilation by the EPA of facilities which report storage, transportation, treatment, or disposal of hazardous waste. Unlike the RCRA CORRACTS/TSD database, the RCRA Non-CORRACTS/TSD database does not include RCRA facilities where corrective action is required.	0.5	0

State/Tribal Databases

Database	Description	Radius (miles)	Listings
Brownfields	State and/or Tribal listing of Brownfield properties addressed by Cooperative Agreement Recipients or Targeted Brownfields Assessments.	0.5	0
IC	Sites included on the Brownfields Sites listing that have institutional controls in place.	Site	0
LUST	State and/or Tribal database of leaking underground storage tanks in the state of Utah.	0.5	24
SHWS	The State of Utah does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.	0.5	N/A
SWF/LF	State and/or Tribal database of solid waste facilities located within Utah. The database information may include the facility name, class, operation type, area, estimated operational life, and owner.	0.5	0
UST	State and/or Tribal database of registered storage tanks in the State of Utah which may include the owner and location of the tanks.	Site and adjoining properties	1

Database	Description	Radius (miles)	Listings
VCP	State and/or Tribal facilities included as Voluntary Cleanup Program sites.	0.5	1

In addition to the above ASTM-required listings, Terracon reviewed other federal, state, local, and proprietary databases provided by the database firm. A list of the additional reviewed databases is included in the regulatory database report included in Appendix D.

The following table summarizes the site-specific information provided by the database and/or gathered by this office for identified facilities. Facilities are listed in order of proximity to the site. Additional discussion for selected facilities follows the summary table.

Listed Facilities

Facility Name And Location	Estimated Distance / Direction/Gradient	Database Listings	REC, CREC, or HREC
Schovaers Electronic 22 Jeremy Street	Site	CA HAZNET, RCRA-SQG, FINDS	No, file review discussed below
Crown Plating Company. 14 Jeremy Street	South-adjoining / cross- to down-gradient	RCRA-SQG, INFDS, US AIR, FTTS, UT NPDES	REC discussed below
Creed Laboratories 15 South Jeremy Street	East-adjoining / 100 feet / Up-gradient	UST	No, file review discussed below
Bullough Insulation 50 South 800 West	Southeast-adjoining / 100 feet / cross-gradient	LUST	No, file review discussed below
Bullough Asbestos (former) 50 South 800 West	Southeast-adjoining / 100 feet / cross-gradient	CERCLA NFRAP	No, file review discussed below

The site was identified as the Schovaers Electronics RCRA-SQG facility (Facility ID #UTD088325769). According to the regulatory database, this facility is a small quantity generator that generates fewer than 1,000 kg but more than 100 kg monthly of D000 class (unspecified), corrosive waste and lead. Files reviewed at the Division of Solid and Hazardous Waste indicated a compliance evaluation inspection was conducted on the facility in 1996. Based on the inspection by the Division of Solid and Hazardous Waste, the facility was found to be in violation of their hazardous waste storage. Drums were observed without “hazardous waste” or container content labels, without accumulation dates, and the drums were left open. The remaining violations consisted of records keeping in the facility. The facility was lacking a Contingency Plan, Personnel Training Plan, and Preparedness and Prevention Documentation. Compliance inspections were conducted at the facility again in 2009 and 2014 (Appendix D). No violations were noted. Based on lack of violations in the 2009 and 2014 inspection, this RCRA-SQG listing does not represent a REC.

The site was also listed as a CA HAZNET facility. This listing is derived from the California EPA agency and Terracon does not know the correlation between the listing and the site. The site was also identified as a FINDS listings, which is an EPA database for tracking regulated sites. These two listings for the facility do not represent a REC.

The Crown Plating Company, Inc. RCRA-SQG facility (Facility ID #UTD009086372), FTTS and FINDS facility, as well as a UT NPDES facility (Permit #UTR000378) adjoins the site to the north. Terracon reviewed the facility's regulatory files on record with the Division of Solid and Hazardous Waste. In the mid-1980s to the early 1990s, the facility was inspected and found to be in violation of improper storage of materials, drums and containers lacking labels, corroding drums, unsealed drums and disposal of hazardous waste from the facility without hazardous waste manifests to verify proper disposal occurred. Inspections conducted during this time frame also documented the cluttered nature of the storage at the facility. Of particular concern, was the storage and disposal of sludge produced from the rinse baths at the facility and the use, storage, and disposal of spent 1,1,1-trichloroethane (TCA) and methylene chloride. The TCA and methylene chloride were used at the facility for degreasing purposes. The hazardous waste inspections conducted during this time frame indicated the TCA was being disposed of through evaporation and by pouring the spent degreaser on the ground on the southeast section of the property, immediately adjacent to the site.

Currently, the facility is classified as a small quantity generator. According to the most recent Compliance Evaluation Inspection conducted in December 2013, this facility produces approximately 600 to 700 pounds of sludge monthly. The sludge is classified as a hazardous waste due to the amount of chrome (hexavalent chromium) it contains. Approximately 20 gallons of methylene chloride, used as a paint stripper, is also produced monthly. No violations were noted in the most recent compliance evaluation.

Based on the violations noted in the inspections that occurred in the mid-1980s to the early 1990s, documented poor housekeeping practices, improper to absent drum labeling, and the improper disposal of hazardous waste onto the ground at the facility within 5 to 25 feet of the site's northern boundary line, this RCRA SQG facility represents a REC to the site.

The Creed Laboratories UST facility (Facility ID #4001520) formerly adjoined the site to the east. DERR records were limited; however, closure notice and closure plan documents for the facility indicated two 2,000-gallon diesel underground storage tanks were removed from the facility in September 1989. The closure plan noted one tank to contain diesel and the second tank to contain butyl CELLOSOLVE™, a glycol ether-based solvent. Two soil samples were collected at a depth during the closure and analyzed for total petroleum hydrocarbons and BTEX. Analytical results indicated constituents were not present above laboratory detection limits. Based on the clean closure and length of time since the UST closure, in Terracon's opinion, this site does not represent a REC to the site.

The Bullough Insulation LUST facility (Facility ID #4001968) had two underground storage tanks, one 4,000-gallon unleaded gasoline and one 3,000-gallon gasoline, and a dispenser removed from the facility in 1993. Two water samples were collected at approximately 10 feet below ground surface (bgs) and analyzed for TPH constituents and BTEX. Two water samples were collected from the east and west end of the tank pit area, at 10 to 12 feet bgs. Soils were screened in the field with a PID that indicated contamination was not present in soils and, therefore, soil samples were not collected or analyzed by the laboratory. Analysis of the water collected from the tank pit area indicated TPH and BTEX concentrations were well below current ISL levels. The site maps in the UST closure notice indicated the former tank pit area was located approximately 335 feet cross-gradient of the site. The site was closed by DERR In May 1995 through an internal memo. Based on the regulatory status, the minimal impacts present, the distance of the tank pit to the site and cross-gradient position of the facility with respect to the site, this former LUST facility does not represent a REC to the site.

This facility was also identified as the Bullough Asbestos CERCLA NFRAP facility (Facility ID # UTN000802419). According to the regulatory database and DERR records, a removal assessment was conducted by the EPA in August 2004. There were two structures located on the property: one long white building and one metal storage structure. Observations along the north side of the metal structure found several patches of asbestos insulation residue. Removal of the substance was completed in October 2004, and facility records were archived in April 2006. Based on remedial efforts and type of contaminant, this former CERCLA NFRAP facility does not represent a REC to the site.

The remaining facilities listed in the database report do not appear to represent RECs to the site at this time based upon regulatory status, apparent topographic gradient, and/or distance from the site.

Unmapped facilities are those that do not contain sufficient address or location information to evaluate the facility listing locations relative to the site. The report listed six facilities in the unmapped section. Determining the location of unmapped facilities is beyond the scope of this assessment; however, Terracon identified one listing that was within close proximity of the site, the former Bullough Asbestos CERCLA NFRAP facility, which is discussed above. No other orphan listings in the database were identified as the site or adjacent properties. These facilities are listed in the database report in Appendix D.

4.2 Local Agency Inquiries

Agency Contacted	Response
Salt Lake County Health Department, Environmental Division / Email	According to Ms. Ashley Hall of the Salt Lake County Health Department, no records were found for the site.
Salt Lake City Fire Department / Salt Lake City GRAMA portal	The Salt Lake City Fire Department does not have any records associated with the site.
Utah Department of Environmental Quality (DEQ) EZ Records Search	The site was not identified in the databases reviewed, which included information regarding releases to soil, groundwater and air.

5.0 SITE RECONNAISSANCE

5.1 General Site Information

Information contained in this section is based on a visual reconnaissance conducted while walking through the site and the accessible interior areas of structures, if any, located on the site. Exhibit 2 in Appendix A is a Site Diagram of the site. Photo documentation of the site at the time of the visual reconnaissance is provided in Appendix E. Credentials of the individuals planning and conducting the site visit are included in Appendix F.

General Site Information

Site Reconnaissance	
Field Personnel	Ashley A. Scothern
Reconnaissance Date	May 1, 2015
Weather Conditions	High 60s, sunny and partly cloudy
Site Contact/Title	Mr. Robert Schovaer / Property Owner Representative

Building Description				
Building Identification	**Building Use**	**Construction Date**	**Stories**	**Approx. Size (ft²)**
East Section	Office, film tooling, and photo room	1962	1	2,500
Center Section	General and chemical storage	1962	1	500
West Section	Rout, drill and plating room	1962	1	2,500
Garage	Personal storage	1962	1	400
Site Utilities				
Drinking Water	Salt Lake City Corporation			
Wastewater	Salt Lake City Corporation			

5.2 Overview of Current Site Occupants

The site is an approximately 0.34-acre parcel (Parcel ID #15-02-204-007) owned by Schovaers Electronics. An approximately 6,000-square-foot industrial building occupies the site. An approximately 400-square-foot garage is located on the northwest side of the site. Paved parking areas are located to the east and north of the building. A small weedy area is present on the western boundary area. Schovaers Electronics currently occupies the site.

5.3 Overview of Current Site Operations

The facility consists of a photo room, film tooling room, rout room, drill room and plating room storage areas and small office areas. Daily operations at the site include taking copper encapsulated circuit boards and imprinting specific client specification for components to the boards. Once the boards have been drilled, a photo-resist material is added to the circuit board. The boards are then dipped into various baths, according to the metal desired on the board. During the plating process, thin layers of metal are either adhered to or stripped away from the circuit boards. After this, the photo print is stripped from the boards.

The plating tanks are mixed and drained in this area of the site building. Overflow water from the plating tanks and spent solutions drain directly on the wooden pallet flooring in the room, which is collected by the sump in the room. The sump is located next to the wastewater treatment system in the southeast corner of the plating room. The wastewater is treated then discharged into the sanitary sewer system. Historically, etchant from the plating room was observed to have leaked out of the building through the building's seams and concrete flooring. Because of this, a liner was installed above the concrete slab in the plating room for more efficient discharge of overflow water into the sump.

5.4 Site Observations

The following table summarizes site observations and interviews. Affirmative responses (designated by an "X") are discussed in more detail following the table.

Site Characteristics

Category	Item or Feature	Observed
Site Operations, Processes, and Equipment	Emergency generators	
	Air compressors	X
	Hydraulic lifts	
	Dry cleaning	
	Photo processing	X
	Ventilation hoods and/or incinerators	
	Waste treatment systems and/or water treatment systems	X
	Heating and/or cooling systems	

Category	Item or Feature	Observed
	Paint booths	X
	Sub-grade mechanic pits	
	Vehicle repair or maintenance	
	Pesticide/herbicide production or storage	
	Printing operations	
	Electroplating, chrome plating or galvanizing	X
	Salvage operations	
Aboveground Chemical or Waste Storage	Aboveground storage tanks	
	Drums, barrels and/or containers ≥ 5 gallons	X
	MSDS	
Underground Chemical or Waste Storage, Drainage or Collection Systems	Underground storage tanks or ancillary UST equipment	
	Sumps, cisterns, French drains, catch basins and/or dry wells	X
	Grease traps	
	Septic tanks and/or leach fields	
	Oil/water separators, clarifiers, sand traps, interceptors	X
	Pipeline markers	
	Interior floor drains	
Electrical Transformers/ PCBs	Transformers and/or capacitors	X
	Other equipment	
Releases or Potential Releases	Stressed vegetation	
	Stained soil	
	Stained pavement or similar surface	X
	Leachate and/or waste seeps	
	Trash, debris and/or other waste materials	
	Dumping or disposal areas	X
	Water discoloration, odor, sheen, and/or free floating product	
	Strong, pungent or noxious odors	
	Exterior pipe discharges and/or other effluent discharges	
Other Notable Site Features	Surface water bodies	
	Quarries or pits	
	Wastewater lagoons	
	Wells	

Site Operations, Processes, and Equipment

Air compressors

One air compressor was observed in a small lean-to building on the northern exterior wall of the site building (Photograph 1). The air compressor was stored on asphalt-paved surfaces. Staining was noted on the compressor and on the asphalt paving. Due to the limited source and generally non-hazardous nature of compressor oil, this staining represents a de minimis condition to the site.

Photo processing

After the circuit boards have been drilled, to place the components on the boards, a photo print is placed on the boards, prior to being plated. The facility developed film for the photo print prior to overlaying the film on the circuit boards. Silver by-product waste from this process is captured in 5-gallon containers and stored, prior to removal from the site, in the plating room. As the silver is captured and disposed of off site, photo processing at the site does not represent a REC to the site.

Waste treatment systems and/or water treatment systems

A wastewater treatment facility was observed in the southeast corner of the plating room, which is located in the southwest section of the site building (Photograph 2). The system consists of neutralization, clarification, settling and filtering of water used in the electroplating process before the water is discharged into the municipal sewer system. The wastewater treatment system is located on concrete flooring. Because the site has a long history of wastewater discharge and the system has been used for approximately 38 years, allowing for compromises in the discharge lines, the wastewater treatment facility is part of the long-term industrial use REC noted for this property.

Paint booth

One small paint booth was present in the photo room in the northeast section of the site (Photograph 3). Mr. Schovaer stated the paint booth is used for cleaning out silk screens by applying high pressure air to the silk screens for cleaning purposes. Minor staining was observed in the booth. Based on the minimal amount of staining and not using the booth as a paint booth, this paint booth does not represent a REC to the site.

Electroplating

The site is an electroplating facility. Once the circuit boards have been imprinted with the board design, the boards are then transferred to the plating room. Numerous baths are used in the electroplating process, such as gold, nickel, copper, solder ether (etchant), an acid cleaning line bath and an electrolysis copper line bath (Photographs 4 and 5). The solution in the plating facility either overflows the plating tanks or evaporates from the tanks. When the solutions in the tanks are low, the accumulated sludge is then removed and run through the wastewater treatment system and recycled or labeled as hazardous waste and removed. Based on the length of time the site has operated as an electroplating facility (~38 years), the use of the site as an electroplating facility represents a REC to the site.

Aboveground Chemical or Waste Storage

Drums, barrels and/or containers ≥ 5 gallons

Eight 55-gallons of etchant, one 55-gallon sulfuric acid, one 55-gallon Resolve 211 developer, and one 55-gallon flux were stored in the general warehouse area, west of the photo room (Photograph 6). Two 55-gallon drums of hazardous waste sludge were observed in the loading dock area of the facility (Photograph 7). Stored in the plating room were one 55-gallon drum of surfactant, one 55-gallon drum metal precipitate (hazardous waste accumulation at the site), one 55-gallon drum solder conditioner, one 55-gallon drum of nitric acid, one 55-gallon drum of caustic soda, one 25-gallon surfactant, and one 5-gallon container of nickel sulfate (Photograph 8). Numerous five gallon containers of spent enchant and spent silver from the photo process at the facility were observed along the northern wall of the plating room (Photographs 9 and 10). Also stored with the spent silver were numerous 5-gallon containers of copper sulfate, brightener, hydrochloric acid, solder stripper, and fluoric acid (Photograph 11). The drums and containers were stored on intact concrete flooring and wooden pallet flooring in the plating room. Staining was not observed under the drums. However, the very poor storage is indicative of potential releases. Generally, these releases would be contained and treated in the sump wastewater treatment system. However, the poor storage of the hazardous materials is part of the long-term industrial use REC noted for this property.

Sumps, cisterns, French drains, catch basins and/or dry wells

A sump is located in southeast section of the plating room, next to the wastewater treatment system (Photograph 12). The sump is used to capture the spilled solution from the plating tanks, which is then pumped to the waste water treatment system. The sump pumps the water into the wastewater treatment facility where the metals are filtered out of the water. Treated water is then discharged into the sanitary sewer system. Based on the age of the sump (~38 years) compromises to the system are most likely; therefore, the presence of the sump and wastewater treatment system is part of the long-term industrial use REC noted for this property.

Releases or Potential Releases

Stained pavement or similar surface

Staining was observed on the northern section of the exterior area of the site. Although drums in the area were empty, noticeable drum imprints on the asphalt were present, indicating long-term storage of drums in the area (Photograph 13). Furthermore, staining was observed to have migrated north on the site from the drum storage area (Photograph 14). Staining was observed on asphalt surfaces that were cracked, allowing for staining to migrate vertically into the soils at the site. Based on the long-term staining, migration of the staining northward, and the cracked asphalt surfaces, the observed staining represents a REC to the site.

Dumping or disposal areas

During site inspection, Mr. Schovaer mentioned to Terracon that in the early 1980s etchant was visibly seeping out of the building's southern exterior wall. Historically, a loading platform for the rail spur that entered the property was present along the southern wall. Due to this, the concrete slab for the building is elevated approximately three feet from ground surface (Photograph 15). Due to the visible seepage in the early 1980s, Mr. Schovaers installed a floor lining in the plating room. The extent of the release is unknown. The known release of the etchant with its associated metals is part of the long-term industrial use REC noted for this property.

6.0 ADJOINING PROPERTY RECONNAISSANCE

Visual observations of adjoining properties (from site boundaries) are summarized below.

Adjoining Properties

Direction	Description
North	Crown Plating (8 and 14 South Jeremy Street) adjoins the site to the north (Photograph 16).
East	Jeremy Street and Heritage Forge Inc. (15 South Jeremy Street) adjoins the site to the east (Photograph 17).
South	Liberty Auto Work (42 South Jeremy Street) adjoins the site to the south (Photograph 18).
West	EPC International Warehouse (25 South 900 West) adjoins the site to the west (Photograph 19).

Indications of RECs were not observed with the adjoining properties.

7.0 ADDITIONAL SERVICES

Per the agreed scope of services specified in the proposal, additional services (e.g. asbestos sampling, lead-based paint sampling, wetlands evaluation, lead in drinking water testing, radon testing, vapor encroachment screening, etc.) were not conducted.

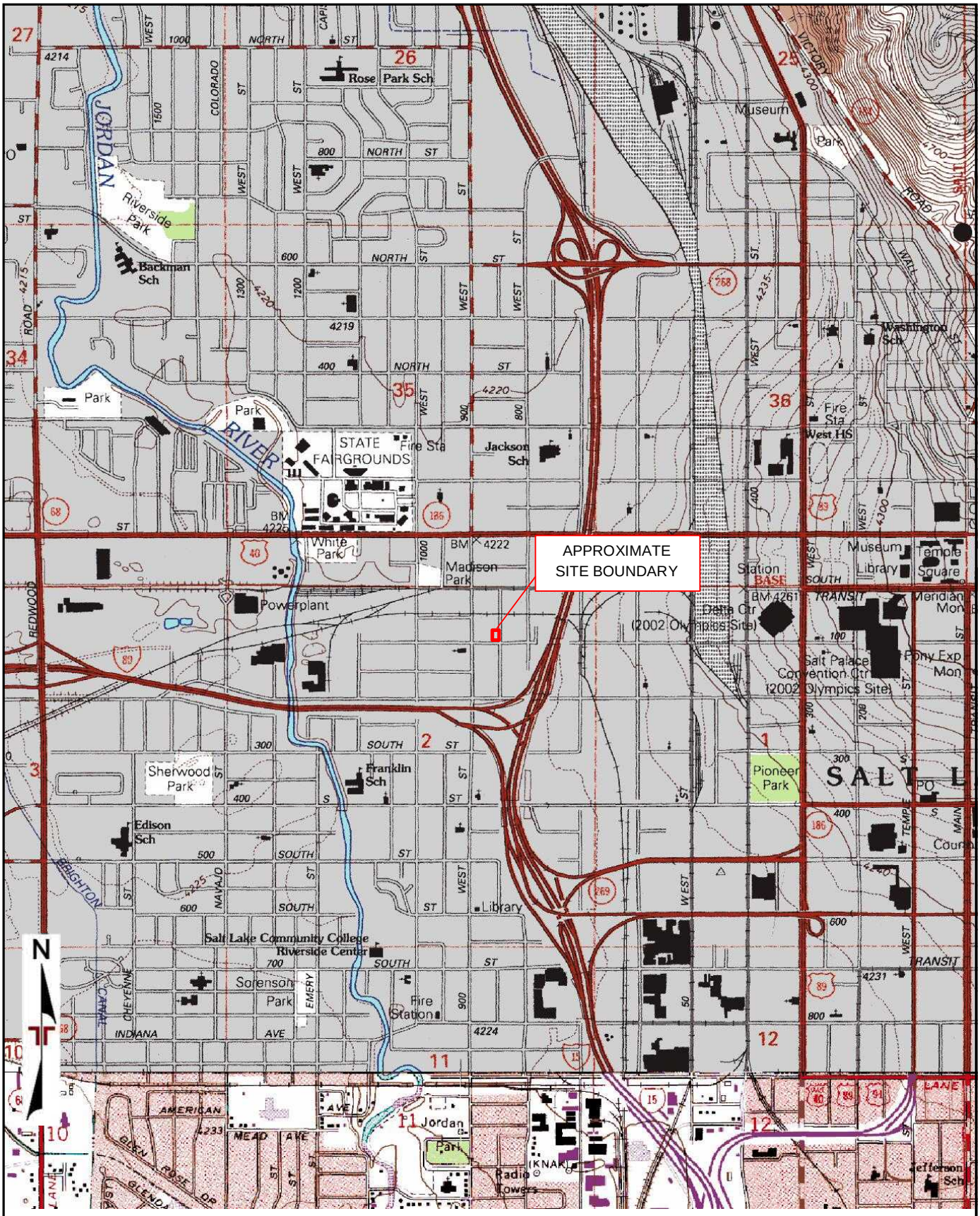
8.0 DECLARATION

I, Ashley A. Scothern, declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in Section 312.10 of 40 CFR 312; and I have the specific qualifications based on education, training, and experience to assess a

property of the nature, history, and setting of the site. I have developed and performed the All Appropriate Inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Ashley A. Scothern, E.P.
Staff Environmental Scientist
.

APPENDIX A
EXHIBIT 1 – TOPOGRAPHIC MAP
EXHIBIT 2 – SITE DIAGRAM



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: SALT LAKE CITY NORTH, UT (1/1/1998) and SALT LAKE CITY SOUTH, UT (1/1/1999).

Project Manager:	AS
Drawn by:	AS
Checked by:	AS
Approved by:	KW

Project No.	AL157312
Scale:	1"=24,000 SF
File Name:	Ex.2
Date:	5-15

Terracon
640 E. Wilmington Ave.
Salt Lake City, UT 84106

TOPOGRAPHIC MAP

Schovaers Electronics
22 South Jeremy Street
Salt Lake City, Utah

Exhibit
1

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: ?	Project No. AL157312
Drawn by: ?	Scale: AS SHOWN
Checked by: ?	File Name: ?
Approved by: ?	Date: ?

Terracon
640 E. Wilmington Ave.
Salt Lake City, UT 84106

SITE DIAGRAM

SLC RDA - Schovaers 22 S Jeremy Pl, SLC
22 South Jeremy Street
Salt Lake City, UT

Exhibit 2

APPENDIX B
SITE PHOTOGRAPHS

Photo #1 Air compressor observed in a small lean-to building on the north exterior of the site building.

Photo #2 Wastewater treatment system, located in the southeast corner of the plating room.

Photo #3 Paint booth observed in the photo room of the site building.

Photo #4 Various rinse baths observed in the plating room of the site building.

Photo #5 Etchant bath present in the southwest corner of the plating room.

Photo #6 Observed 55-gallon drums of etchant stored to the west of the photo room.

Photo #7 Observed spent enchant, stored in the loading dock area of the site.

Photo #8 Drum storage of surfactant, caustic soda, etc,. observed in the plating room.

Photo #9 Observed spent silver storage in the plating room.

Photo #10 Representative photograph of spent enchant at the site.

Photo #11 Product storage observed in the plating room.

Photo #12 Sump location is underneath the wooden panel flooring. Pipe is showing the connection between sump and WWTS.

Photo #13 Observed staining migrating northward from the drum storage area.

Photo #14 Drum storage (empty); however, note the drum imprints from long term storage and staining in the area.

Photo #15 Red line shows approximate area where spent enchant was seeping from the plating room to the exterior of the building.

Photo #16 North-adjoining Crown Plating facility, looking northwest from the east side of Jeremy Street.

Photo #17 East-adjoining Jeremy Street and stone facility, looking northeast from the west side of Jeremy Street.

Photo #18 South-adjoining vehicle service shop, looking south from the southeast boundary area of the site.

Photo #19 West-adjoining warehouse, looking southeast from the east side of 900 West.

APPENDIX C
HISTORICAL DOCUMENTATION AND USER QUESTIONNAIRE

ASTM E 1527-13 USER QUESTIONNAIRE

Proposal No: PAL150187

In order to qualify for one of the Landowner Liability Protections (LLPs) offered by the Small Business Relief and Brownfields Revitalization Act of 2002 (the "Brownfields Amendments"), the user must respond to the following questions. Failure to provide this information to the environmental professional may result in significant data gaps, which may limit our ability to identify recognized environmental conditions resulting in a determination that "all appropriate inquiry" is not complete. This form represents a type of interview and as such, the user has an obligation to answer all questions in good faith, to the extent of their actual knowledge.

Site Name: Schovaers Electronics
Site Address: 22 South Jeremy Street, Salt Lake City, Utah

1) Did a search of recorded land title records (or judicial records where appropriate) identify any environmental liens filed or recorded against the property under federal, tribal, state, or local law (40 CFR 312.25)? ✓No ___Yes If yes, please explain.

2) Did a search of recorded land title records (or judicial records where appropriate) identify any activity and use limitations (AULs), such as engineering controls, land use restrictions, or institutional controls that are in place at the property and/or have been filed or recorded against the property under federal, tribal, state, or local law (40 CFR 312.26)? ✓No ___Yes If yes, please explain.

3) Do you have any specialized knowledge or experience related to the site or nearby properties? For example, are you involved in the same line of business as the current or former occupants of the site or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business (40 CFR 312-28)? ✓No ___Yes If yes, please explain.

4) Does the purchase price being paid for this site reasonably reflect the fair market value of the site (40 CFR 312.29)? ___No ___Yes NA

If no, have you considered whether the lower purchase price is because contamination is known or believed to be present at the site (40 CFR 312.29)? ___No ___Yes If yes, please explain. NA

5) Are you aware of commonly known or reasonably ascertainable information about the site that would help the environmental professional to identify conditions indicative of releases or threatened releases (40 CFR 312.30)?
___No ✓Yes If yes, please explain. Prior to a foundation liner being installed in 80s, possible leaking of acids into cracked cement may have occurred. Also a small quantity generator of ~~bar~~ filter cake.

6) Based on your knowledge and experience related to the site, are there any obvious indicators that point to the presence or likely presence of contamination at the site (40 CFR 312.31)? ___No ✓Yes If yes, please explain.
As stated in #5.

Helpful Documents Checklist

Pursuant to ASTM E 1527-13 § 10.8, do you know whether any of the following documents exist related to the subject property and, if so, whether copies can and will be provided to the environmental professional? Check all that apply.

- ☐ Environmental site assessment reports
- ☐ Environmental compliance audit reports
- ☐ Geotechnical studies
- ☐ Reports regarding hydrogeologic conditions on the property or surrounding area
- ☐ Registrations for above or underground storage tanks
- ☐ Notices or other correspondence from any governmental agency relating to past or current violations of environmental laws with respect to the property or relating to environmental liens encumbering the property
- ☐ Registrations for underground injection systems
- ☑ Environmental permits/plans, solid waste permits, hazardous waste disposal permits, wastewater permits, NPDES permits, underground injection permits, SPCC plans

↳ property owner or govt entity monitoring this should provide.

Ashlie Easterling
Name (Authorized Client Representative)

~~RDA~~ Project Coordinator/■ Grant Program Mngr.
Title

Ashlie Easterling
Signature

4/23/15
Date

COMMITMENT FOR TITLE INSURANCE

ISSUED BY

First American Title Insurance Company National Commercial Services
215 South State Street, Ste. 380, Salt Lake City, UT 84111
Phone: (801)536-3100 | Fax: (866)344-5051

First American Title Insurance Company National Commercial Services
215 South State Street, Ste. 380
Salt Lake City, UT 84111

April 07, 2015

Order Number: NCS-723634-SLC1

Attn: Anna Irons - Debi Harris

Additional copies, if any, have been sent to the following parties:

Ashlie Easterling, Redevelopment Agency of Salt Lake City, P.O. Box 145518, Salt Lake City , UT 84111-5518

***

RE: Proposed Owner/Applicant: To Be Determined

We agree to issue a policy to you according to the terms of this Commitment. When we show the policy amount and your name as the proposed insured in Schedule A, this Commitment becomes effective as of the Commitment Date shown in Schedule A.

If the Requirements shown in this Commitment have not been met within six months after the Commitment Date, our obligation under this Commitment will end. Also, our obligation under this Commitment will end when the Policy is issued and then our obligation to you will be under the Policy.

Our obligation under this commitment is limited by the following:

The Provisions in Schedule A.
The Requirements in Schedule B-1.
The Exceptions in Schedule B-2.
The Conditions on the inside cover page.

The Commitment is not valid with out SCHEDULE A and Sections 1 and 2 of SCHEDULE B.

Underwritten by:

First American Title Insurance Company

Dennis J. Gilmore
President

Jeffrey S. Robinson
Secretary

SCHEDULE A

ESCROW/CLOSING INQUIRIES should be directed to your Escrow Officer: Anna Irons at (801)536-3100 located at 215 South State Street, Ste. 380, Salt Lake City, UT 84111.

Effective Date: March 26, 2015 at 7:30 a.m.

1. Policy or (Policies) to be issued:

   ALTA 2006 Standard Owner's for $TBD — PREMIUM $TBD

   Proposed Insured:
   To Be Determined

   Endorsements TBD — PREMIUM $TBD

2. The estate or interest in the land described or referred to in this commitment and covered herein is fee simple and title thereto is at the effective date hereof vested in:

   Schovaers Electronic Corporation, a Utah Corporation

3. The land referred to in this Commitment is located in Salt Lake County, UT and is described as:

   COMMENCING 8 RODS EAST AND 8 RODS SOUTH FROM THE NORTHWEST CORNER OF LOT 6, BLOCK 51, PLAT "C" SALT LAKE CITY SURVEY; AND RUNNING THENCE SOUTH 100 FEET; THENCE WEST 148.5 FEET; THENCE NORTH 100 FEET; THENCE EAST 148.5 FEET TO THE POINT OF BEGINNING.

   Said property is also known by the street address of:
   22 South Jeremy Street
   Salt Lake City, UT 84104

SCHEDULE B - Section 1
Requirements

The following are the requirements to be complied with:

1. Pay the agreed amounts for interest in the land and/or the mortgage or deed of trust to be insured.

2. Pay us the premiums, fees and charges for the policy. In the event the transaction for which this commitment is furnished cancels, a cancellation fee will be imposed.

3. Provide us with releases, reconveyances or other instruments, acceptable to us, including payment of any amounts due, removing the encumbrances shown in Schedule B-2 that are objectionable to the proposed insured.

4. Provide us with copies of appropriate agreements, resolutions, certificates, or other evidence needed to identify the parties authorized to execute the documents creating the interest to be insured.

5. The documents creating the interest to be insured must be signed, delivered and recorded.

6. You must tell us, in writing, the name of anyone not referred to in this Commitment who will receive an interest in, or who will make a loan secured by a deed of trust or mortgage secured by, the land described in this Commitment.

7. After we have received the information requested in these requirements, together with any other information about the transaction, we will have the right to add requirements to this Schedule B-1 or special exceptions to Schedule B-2.

***

SCHEDULE B - Section 2
Exceptions

Any policy we issue will have the following exceptions unless they are taken care of to our satisfaction.

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the public records.

2. Any facts, rights, interest or claims which are not shown by the public records but which could be ascertained by an inspection of said land or by making inquiry of persons in possession thereof.

3. Easements, claims of easements or encumbrances which are not shown by the public records.

4. Discrepancies, conflicts in boundary lines, shortage in area, encroachments and any other facts which a correct survey would disclose, and which are not shown by public records.

5. Unpatented mining claims; reservations or exceptions in patents or in Acts authorizing the issuance thereof, water rights, claims or title to water.

6. Any lien, or right to a lien, for services, labor or material heretofore or hereafter furnished, imposed by law and not shown by the public records.

7. Defects, liens, encumbrances, adverse claims or other matters, if any, created, first appearing in the public records or attaching subsequent to the effective date hereof but prior to the date the proposed insured acquires of record for value the estate or interest or mortgage thereon covered by this commitment.

(The following affects the subject land)

8. General property taxes for the year 2015 are accruing as a lien, but are not yet due. General property taxes for the year 2014 were paid in the amount of $3,672.61. Tax Parcel No. 15-02-204-007-0000.

(The following affects the subject land)

9. The land is included within the boundaries of Salt Lake City, and is subject to charges and assessments made thereby.

(The following affects the subject land)

10. A Mortgage dated February 7, 1957 by and between The Rocatah Corp., a corporation of the State of Utah, as Mortgagor, and The Mutual Benefit Life Insurance Company, a corporation organized and existing under the laws of the State of New Jersey, as Mortgagee, given to secure an original principal indebtedness of $40,000.00 and any other amounts or obligations secured thereby, recorded February 11, 1957 as Entry No. 1525362 in Book 1388 at Page 67 of Official Records.

According to Official Records, the beneficial interest under said Mortgage was assigned to Diana Robbins and Lester Robbins, Co-Trustees for the benefit of Diana Robbins under Agreement dated April 30, 1956 by that certain Assignment of Mortgage and Collateral Assignment recorded May 18, 1967 as Entry No. 2199810 in Book 2555 at Page 196 of Official Records.

According to Official Records, the beneficial interest under said Mortgage was assigned to Marjorie Friedlander, Ann Leah Aknin, and David Peter Robbins, equally and as tenants in common, by that certain Assignment of Mortgage and Collateral Assignment recorded March 17, 1972 as Entry No. 2443602 in Book 3052 at Page 243 of Official Records.

Release of Mortgage recorded July 20, 1977 as Entry No. 2972159 in Book 4520 at Page 1021 of Official Records.

NOTE: The aforementioned Release of Mortgage was not executed by all Mortgagees.

Release of Mortgage recorded January 19, 1978 as Entry No. 3053396 in Book 4612 at Page 494 of Official Records.

NOTE: The aforementioned Release of Mortgage was not executed by all Mortgagees.

(The following affects the subject land)

11. An Assignment of Lease, wherein The Rocatah Corp., a corporation of the State of Utah, assigns all rents, leases, income and profits accruing from the land to The Mutual Benefit Life Insurance Company, a corporation organized and existing under the laws of the State of New Jersey, recorded February 11, 1957 as Entry No. 1525364 in Book 1388 at Page 78 of Official Records.

According to Official Records, the beneficial interest under said Assignment of Lease was assigned to Diana Robbins and Lester Robbins, Co-Trustees for the benefit of Diana Robbins under Agreement dated April 30, 1956 by that certain Assignment of Mortgage and Collateral Assignment recorded May 18, 1967 as Entry No. 2199810 in Book 2555 at Page 196 of Official Records.

According to Official Records, the beneficial interest under said Assignment of Lease was assigned to Marjorie Friedlander, Ann Leah Aknin, and David Peter Robbins, equally and as tenants in common, by that certain Assignment of Mortgage and Collateral Assignment recorded March 17, 1972 as Entry No. 2443602 in Book 3052 at Page 243 of Official Records.

(The following affects the subject land, together with other land)

12. Salt Lake City Ordinance No. 70 of 2005 (Adopting the Central Community Master Plan) recorded November 22, 2005 as Entry No. 9560336 in Book 9220 at Page 4101 of Official Records.

(The following affects the subject land, together with other land)

13. Ordinance No. 56 of 2011 (Adoption of North Temple Urban Renewal Area Project Area Plan) recorded October 13, 2011 as Entry No. 11260079 in Book 9957 at Page 6699 of Official Records.

(The following affects the subject land)

14. The State Construction Registry discloses the following Preliminary Notice(s): None

***

The name(s) Schovaers Electronic Corporation, has/have been checked for judgments, State and Federal tax liens, and bankruptcies and if any were found, are disclosed herein .

***

Title inquiries should be directed to Steve Nielsen @ (801)578-8826.

***

NOTE: The policy(ies) to be issued as a result of this Commitment contain an Arbitration Clause set forth in the Conditions/Conditions and Stipulations Section. The following is included for the information of the proposed insured(s):

Any matter in dispute between you and the company may be subject to arbitration as an alternative to court action pursuant to the rules of the American Arbitration Association or other recognized arbitrator, a copy of which is available on request from the company. Any decision reached by arbitration shall be binding upon both you and the company. The arbitration award may include attorney's fees if allowed by state law and may be entered as a judgment in any court of proper jurisdiction.

***

In the event the transaction for which this commitment was ordered "cancels", please refer to Paragraph B under Schedule B, Section 1 for required cancellation fee.

***

CONDITIONS

1. **DEFINITIONS**

(a) "Mortgage" means mortgage, deed of trust or other security instrument.
(b) "Public Records" means title records that give constructive notice of matters affecting the title according to the state law where the land is located.

2. **LATER DEFECTS**

The Exceptions in Schedule B may be amended to show any defects, liens or encumbrances that appear for the first time in the public records or are created or attached between the Commitment Date and the date on which all of the Requirements are met. We shall have no liability to you because of this amendment.

3. **EXISTING DEFECTS**

If any defects, liens or encumbrances existing at Commitment Date are not shown in Schedule B, we may amend Schedule B to show them. If we do amend Schedule B to show these defects, liens or encumbrances, we shall be liable to you according to Paragraph 4 below unless you knew of this information and did not tell us about it in writing.

4. **LIMITATION OF OUR LIABILITY**

Our only obligation is to issue to you the Policy referred to in this Commitment, when you have met its Requirements. If we have any liability to you for any loss you incur because of an error in this Commitment, our liability will be limited to your actual loss caused by your relying this Commimtent when you acted in good faith to:

comply with the Requirements
or
eliminate with our written consent any Exceptions shown in Schedule B

We shall not be liable for more than the Amount shown in Schedule A of this Commitment and our liability is subject to the terms of the Policy form to be issued to you.

5. **CLAIMS MUST BE BASED ON THIS COMMITMENT**

Any claims, whether or not based on negligence, which you may have against us concerning the title to the land must be based on this Commitment and is subject to its terms

PRIVACY POLICY

We Are Committed to Safeguarding Customer Information

In order to better serve your needs now and in the future, we may ask you to provide us with certain information. We understand that you may be concerned about what we will do with such information - particularly any personal or financial information. We agree that you have a right to know how we will utilize the personal information you provide to us. Therefore, together with our parent company, The First American Corporation, we have adopted this Privacy Policy to govern the use and handling of your personal information.

Applicability

This Privacy Policy governs our use of the information which you provide to us. It does not govern the manner in which we may use information we have obtained from any other source, such as information obtained from public records or from another person or entity. First American has also adopted broader guidelines that govern our use of personal information regardless of its source. First American calls these guidelines its *Fair Information Values*, a copy of which can be found on our web site at www.firstam.com.

Types of Information

Depending upon which of our services you are utilizing, the types of nonpublic personal information that we may collect include:

- Information we receive from you on applications, forms and in other communications to us, whether in writing, in person, by telephone or any other means;
- Information about your transactions with us, our affiliated companies, or others; and
- Information we receive from a consumer reporting agency.

Use of Information

We request information from you for our own legitimate business purposes and not for the benefit of any nonaffiliated party. Therefore, we will not release your information to nonaffiliated parties except: (1) as necessary for us to provide the product or service you have requested of us; or (2) as permitted by law. We may, however, store such information indefinitely, including the period after which any customer relationship has ceased. Such information may be used for any internal purpose, such as quality control efforts or customer analysis. We may also provide all of the types of nonpublic personal information listed above to one or more of our affiliated companies. Such affiliated companies include financial services providers, such as title insurers, property and casualty insurers, and trust and investment advisory companies, or companies involved in real estate services, such as appraisal companies, home warranty companies, and escrow companies. Furthermore, we may also provide all information we collect, as described above, to companies that perform marketing services on our behalf, on behalf of our affiliated companies, or to other financial institutions with whom we or our affiliated companies have joint marketing agreements.

Former Customers

Even if you are no longer our customer, our Privacy Policy will continue to apply.

Confidentiality and Security

We will use our best efforts to ensure that no unauthorized parties have access to any of your information. We restrict access to nonpublic personal information about you to those individuals and entities who need to know that information to provide products and services to you. We will use our best efforts to train and oversee our employees and agents to ensure that your information will be handled responsibly and in accordance with this Privacy Policy and First American's *Fair Information Values*. We currently maintain physical, electronic, and procedural safeguards that comply with federal regulations to guard your nonpublic personal information.

Terracon

PROPERTY OWNER
SITE ASSESSMENT QUESTIONNAIRE

Please return by Fax (801 466-9616) or email to Ashley Scothern email: Ashley.Scothern@terracon.com **or** aapizzello@terracon.com

Property Name/Address: Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Utah

Project #: AL157312

Form Completed By: BOB SCHOVAERS Date: 4-30-15

Address 22 JEREMY STREET 84104 Phone No. 801-521-7668

Your relationship to the property (Owner, Owner Representative, Property Manager, Tenant, etc.): OWNER REPRESENTATIVE

How long have you owned the property? 38 YEARS

How long have you been associated with, or had knowledge of, the property? 38 YEARS

Section 1 Current and Historical Uses of Property

1. Name(s) of current and any previous occupant(s) or provide a tenant list.
   SCHOVAERS ELECTRONICS CORPORATION

2. Please describe the current use(s) of the property or indicate uses on the tenant list.
   PRINTED CIRCUIT BOARD MANUFACTURING

3. Please describe the past (historic) uses of the property, with approximate dates.
   WAREHOUSE BEFORE 1977

4. Has a previous Phase I ESA or other Environmental Investigation been done on the property? Please provide a copy of these previous studies.
   NO

Section 2 Potential Environmental Conditions

If you are aware of any of the conditions identified, please answer yes, so that we can clarify all past and present environmental conditions.

Conditions	Yes	No
1. Industrial Uses of Subject or Adjoining Properties Industrial uses including but not limited to: gas/service stations, auto repair or painting, printing, dry cleaners, photo processing, or chrome plating, smelting petroleum refining and/or other chemical manufacturing	X	
2. Agricultural / Silvaculture / Aquiculture Uses Crop production, concentrated animal feeding (poultry, cattle, fish, etc.)		X
3. Waste Storage or Disposal Junkyard, recycling facility, battery storage, landfill, dump, wastewater lagoon		X
4. Equipment Use, Storage, or Abandonment Production lines, hydraulic equipment, vehicles, heavy equipment		X
5. Hazardous Materials (greater than 5-gallon containers or 25-lb bags) Pesticides, paints, solvents, acids, bases, antifreeze, other regulated materials If yes, please list approximate quantities and specify materials on a separate sheet.	X	
6. Petroleum Hydrocarbons (greater than 5 gallon containers) Gasoline, diesel, lubricating oil, waste oil, fuel oil, heating oil or bunker oil, kerosene, benzene, toluene, ethylbenzene xylene, aviation or jet fuel If yes, please list approximate quantities and specify materials on a separate sheet.		X
7. Spills or Releases of Petroleum Hydrocarbons or Hazardous Materials Stained soil, dead vegetation or any other evidence of a petroleum or chemical spill		X
8. PCBs Transformers, hydraulic equipment		X
9. Surface Water Issues Pits, ponds, or lagoons associated with wastewater storage		X
10. Groundwater Issues Monitoring or drinking water wells, injection wells or drains that go directly into the ground		X
11. Wastewater Issues Floor drains and trenches, sumps, oil water separators on the site	X	

Conditions	Yes	No
12. Underground Storage Tanks (USTs) / Above ground Storage Tanks (ASTs) UST / ASTs present or removed – If yes, please specify material stored: gasoline, diesel, fuel oil, used oil, and indicate capacity.		X
13. Asbestos Issues Asbestos Survey, Inspection, Operation and Management Plans, Abatement Reports		X
14. Septic Tanks and Leachfields Currently used or abandoned		X
15. Utility Corridors Oil or Gas Pipelines, Right-of-ways, Easements		X
16. Regulatory Compliance Stormwater Plans, Spill Prevention Plans, Air Permits, Wastewater Discharge Permits, UST Permits, 404 Wetlands Permit. If yes, specify which Plan or Permit. SPILL PREVENTION PLANS, WASTEWATER DISCHARGE PERMITS	X	
17. Natural Resource Issues Wetlands and Riparian Areas, Critical Habitat, Threatened and Endangered Species, Historic or Cultural Resources		X
18. Legal or Regulatory Actions Are you aware of any governmental enforcement actions or environmental liens with regards to the property, or pending lawsuits or administrative proceedings concerning a release or threatened release of any hazardous substances or petroleum products, involving the property against the owner or any tenant of the property?		X

I have completed the above questionnaire to the best of my knowledge.

Signature: Bob Schovaers Date 4-30-15

Printed name: BOB SCHOVAERS Company: SCHOVAERS ELECTRONICS

5. HAZARDOUS MATERIALS

CAUSTIC SODA
FLUX
COPPER ETCHANT
NITRIC ACID
SOLDER STRIPPER
ELECTROLYS COPPER
HYDROCHLORIC ACID
SULFURIC ACID
FLUOBORIC ACID
LEAD FLUORBORATE
TIN FLUORBORATE
TIN-LEAD ANODES
COPPER CHUNKS

PHASE I ENVIRONMENTAL SITE ASSESSMENT
SALT LAKE REDEVELOPMENT AGENCY BLIGHT STUDY
NORTH TEMPLE STREET CORRIDOR
BLIGHT STUDY AREA N4
SOUTH TEMPLE TO 100 SOUTH AND
800 WEST TO 900 WEST
SALT LAKE CITY, UTAH

Project No. 1871-001D

Prepared For

Lewis Young Robertson & Burningham, Inc.
41 North Rio Grande, Suite 101
Salt Lake City, UT 84101

June 21, 2010

Prepared by

Wasatch Environmental, Inc.
2410 West California Avenue
Salt Lake City, UT 84104

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NORTH TEMPLE STREET CORRIDOR
BLIGHT STUDY AREA N4
SOUTH TEMPLE TO 100 SOUTH AND
800 WEST TO 900 WEST
SALT LAKE CITY, UTAH

1. SUMMARY

Wasatch has been contracted by Lewis Young Robertson & Burningham (Lewis Young) to conduct Phase I Environmental Site Assessments (ESAs) on behalf of the Salt Lake Redevelopment Agency (RDA) that address each parcel within the North Temple Street Corridor Blight Study Area. As required by RDA and subject to the limitations presented in Section 2, the purpose of this Phase I ESA is to identify, to the extent feasible pursuant to the processes described in ASTM E 1527-05, recognized environmental conditions in connection with the property. The term "recognized environmental conditions" is defined by ASTM E1527-05 as:

> *The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimus conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.*

According to information provided by Lewis Young, the blight study survey area consists of 514 parcels. For the purposes of conducting Phase I ESAs, the blight survey area has been divided into 20 areas as outlined on Figure 1 in Appendix A. This Phase I ESA report addresses "Area N4" (target property) located between South Temple and 100 South, and 800 West and 900 West as depicted on Figure 2.

Area N4 is located within a mixed commercial and residential area bounded by South Temple to the north, 100 South to the south, 800 West to the east, and 900 West to the west. Jeremy Street extends north to south through the central portion of the target property. Our research, to the extent available, indicates that Area N4 was historically residential from the 1890s to the 1940s when commercial development began. Historical commercial uses are consistent with current activities.

Several recognized environmental conditions have been identified associated with current and past uses within Area N4. Detailed discussion is presented in the following sections of this report. A summary of findings and opinions regarding potential impacts to the target property are presented in Section 8.

Detailed discussion is presented in the following sections of this report.

2. INTRODUCTION

2.1 Detailed Scope of Work

This Phase I ESA has been conducted in general accordance with ASTM E 1527-05 and consists of four components: 1) Records Review, 2) Site Reconnaissance, 3) Interviews, and 4) Report.

There may be environmental issues or conditions at a property that parties may wish to assess in connection with commercial real estate that are outside the scope of the ASTM E 1527-05 practice.

Several non-scope considerations include (but are not limited to) asbestos-containing building materials, lead paint, wetlands, or radon. No implication is intended as to the relative importance of inquiry into such non-scope considerations, nor is this list intended to be all-inclusive. No non-scope considerations are included in this scope of work.

Our site reconnaissance was limited to commercial properties within the study area unless Lewis Young and/or RDA personnel identified conditions on residential properties that indicated the presence or likely presence of hazardous substances or petroleum products. As prescribed in our scope of work approved by Lewis Young and the RDA, we did not enter any of the buildings. There may be observable conditions material to recognized environmental conditions that would only be obtained through an inspection of the building interior.

As prescribed in our scope of work approved by Lewis Young and the RDA, we did not actively seek interviews with any of the property owners or occupants within the study area. There may be information material to recognized environmental conditions that would be obtained through property owner and/or occupant interviews.

As detailed in Section 5.4.1 of this report, some agency records related to regulated facilities located within Area N4 were unavailable for review, limiting our ability to evaluate the potential for releases at those locations.

2.2 Limitations and Exceptions of Assessment

Although conducting Phase I ESAs can minimize the potential risks and liabilities associated with real estate transactions, they cannot be completely eliminated. Limitations exist as to the availability of documentation and constraints of visual and/or physical observations. This assessment has been undertaken within reasonable limits of time and cost. Accuracy and completeness of record information varies among information sources, including government sources. The information provided has not been independently verified, unless we have actual knowledge or it appears obvious that certain information is incorrect. The information presented in this report shall not be interpreted as a warranty as to the presence or non-presence of recognized environmental conditions in connection with the property.

Our services consist of professional opinions made in accordance with generally accepted principles and practices set forth in ASTM E1527-05. This warranty is in lieu of all other warranties either expressed or implied.

2.3 Continued Viability of Environmental Site Assessments

An ESA performed in accordance with ASTM E 1527-05 and completed less than 180 days prior to the date of acquisition or date of intended transaction is presumed to be valid. After 180 days or if information regarding recognized environmental conditions in connection with the target property becomes known, then portions of the environmental site assessment may need to be updated prior to the date of acquisition or date of intended transaction.

2.4 Reliance

This report is prepared for the sole benefit of Lewis Young Robertson & Burningham, and the Redevelopment Agency of Salt Lake City, and may not be relied upon by any other person or entity without the written authorization of Wasatch Environmental, Inc.

3. SITE DESCRIPTION

3.1 Location

The target property encompasses one city block extending from South Temple to 100 South and from 800 West to 900 West in Salt Lake City, Utah (as depicted on Figures 1 through 3 in Appendix A). Parcel numbers and addresses included in Area N4 are listed on Table 2.

3.2 Site and Vicinity General Characteristics

The target property and general vicinity are located in an area of mixed residential and commercial uses.

3.3 Current Uses of the Property

Area N4 consists of a mix of residential and commercial properties. Figure 3 identifies which parcels within Area N4 are residential and which parcels are commercial. Commercial properties in Area N4 consist of the following:

Along South Temple

- 834 West: Pure Water Technologies (filtered water manufacturing)

Along 800 West

- 50 South: Utah International Hostel
- 48 South: Autoquip (automotive repair)

Along 100 South

- 834 West: Oasis Manufacturing (scaffolding manufacturer)

Along 900 West

- 79 South: Precision Aztec Motors (automotive repair and used car sales)
- 55/57 South: Charlie's Motor (automotive repair shop) and This & That Thrift Shop (retail)
- 47 South: Tropical Travel (travel agency)
- 35 South: El Compadre/Mutual Repair (automotive repair)
- 25 South: EPC International (polyurethane foam scrap recycler)
- 15 South: Superprā (carwash)

Along Jeremy Street

- 14 South: Crown Plating (plating)
- 15 South: Heritage Forge (decorative stone and iron wear manufacturer)
- 22 South: Schovaers Electrical (travel agency)
- 42 South: Liberty Auto and Mario's Auto (automotive repair)
- 49/51 South: Union Auto (automotive repair)

3.4 Description of Structures, Roads, and Other Improvements on the Site

Residential development began as early as the late 1880s with commercial redevelopment starting in the late 1940s. The commercial structures are primarily constructed of brick, metal, and concrete and have either flat or pitched asphalt shingle and/or metal roofs. Several commercial businesses along Jeremy Street are residences converted to commercial uses.

Area N4 is bounded by South Temple to the north, 100 South to the south, 800 West to the east, and 900 West to the west. Jeremy Street extends north to south through the central portion.

Salt Lake City Contracts and Construction representative, Kathy Charles, was contacted regarding historic sanitary sewer and water main installations within Area N4. According to Ms. Charles, both sewer and water mains have been installed in the area of Area N4 since the 1920s. It is presumed that the current commercial structures in Area N4 would be serviced by sanitary sewer and water.

We requested information regarding historic natural gas line installations within Area N4 from the Questar Mapping Department. At the time of this report we have not received a response to our request. However, based on information provided by Questar for other areas with the RDA Bight Study, natural gas has been available in the general area prior to the 1940s. It is assumed that the current commercial structures in Area N4 would be serviced by natural gas.

3.5 Current Uses of Adjoining Properties

- North: South Temple then commercial development (addressed in RDA Blight Study Area N5 report)
- West: 900 West then commercial and residential development (addressed in RDA Blight Study Area N9 report)
- South: 100 South then a trophy shop and residential development
- East: 800 West then commercial and residential development (addressed in RDA Blight Study Area N2/N3 report)

4. USER PROVIDED INFORMATION

In accordance with the ASTM E 1527-05, a "user" is defined as the party seeking to complete an environmental site assessment of the property. ASTM E 1527-05 requires that the user shall make known to the environmental professional the reason why the user wants to have the Phase I ESA performed. It is our understanding from Lewis Young, as well as the RDA, that this Phase I ESA is being conducted, to the extent feasible pursuant to the processes described in ASTM E 1527-05, to identify recognized environmental conditions in connection with the property to assist the Redevelopment Agency of Salt Lake City in evaluating environmental conditions that would require remediation as a condition for current or future use or development.

If the user is aware of any specialized knowledge or experience that is material to recognized environmental conditions in connection with the property, it is the user's responsibility to communicate any information based on such specialized knowledge or experience to the environmental professional. Lewis Young and RDA personnel are aware that there may be environmental conditions within the blight study area. If specialized knowledge and/or commonly known/reasonably ascertainable information was provided by Lewis Young or RDA personnel it has been incorporated and referenced in this report.

Because there is no property transaction taking place as part of this blight study, Lewis Young and RDA have no information regarding environmental liens, activity and use limitations, or property valuation reductions due to environmental concerns.

5. RECORDS REVIEW

5.1 Historical Use Information on the Property

Historical sources from 1898 to present were reviewed.

5.1.1 Sources

Fire Insurance Maps: Historic Sanborn maps for the area of the target property were provided by EDR for the years 1898, 1911, 1949, 1950, and 1986.

Historical City Directories: We reviewed historical city (Polk) directories in approximate five-year intervals dated between 1928 and 2002 for listings along South Temple, 100 South, 800 West (historically 700 West), 900 West (historically 800 West), and Jeremy Street. Review of city directories was focused on areas where commercial activities have been concentrated.

Aerial Photographs: We obtained and reviewed a 1997 aerial photograph from MSR Maps (presented as Figure 5) and a 2006 aerial photograph from Google Earth (presented as Figure 6).

5.1.2 Chronology

Properties throughout Area N4 were primarily residential from at least the late 1880s through the late 1940s except as noted in the table below.

Table 1 – Area N4 Properties with Known Commercial Uses

Current Use	Past Uses
Pure Water Technologies 834 West South Temple	1898-2008: *No Listings 2008-Present: Pure Water Technologies
Utah International Hostel/Autoquip 50/48 South 800 West	1889 – 1946: Residential/vacant land 1946 – 1999: Bullough Insulation 1998 – Present: Utah International Hostel
Oasis Manufacturing 834 West 100 South	1898 – 1980s: Residential 1980s - 1998: Not verified Present: Oasis Manufacturing
Supersprā 15 South 900 West	1898 – 1950s: Residential 1957 – Present: Various carwashes
EPC International 25 South 900 West	1898 – late 1950s: Residential 1972: Carpet wholesaler 1975 - 1979: Indico floor coverings 1993: Utah Paperbox 1998: No listings
El Compadre/Mutual Repair 35 South 900 West	1898 – 1911: Residential 1940s – 1950s: Vacant land 1972 – 1975: Fleetwood Construction 1979s – early 1990s: Indico Distributing

	Late 1990s: Rooter Man 2000s: auto repair
Tropical Travel 47 South 900 West	1898 – 2000s: Residential
Charlie's Motors/This & That Thrift Shop 55/57 South 900 West	1898 – late 1950s: Residential 1962 – 1972: Riter Engineering Company 1975 – 1998: Pencock Pest Control 2000s - Present: auto repair and retail
Precision Aztec Motors 79 South 900 West	1898 – early 1950s: Residential 1957 – 2000s: Auto repair and gas station
Crown Plating 14 South Jeremy Street	1898 – late1950s: Residential Early 1960s – Present: Crown Plating
Heritage Forge: 15 South Jeremy Street	1898 – late 1950s: Residential Early 1960s – late 1970s: Greater Mountain Chemical Company Late 1970s – 1990s: Creed Laboratories
Schovaers Electric 22 South Jeremy Street	1898 – early 1950s: Residential Late 1950s – early 1970s: General Cable Corporation Late 1970s - Present: Schovaers Electric
Liberty Auto/Mario's Auto 42 South Jeremy Street	1898 – early 1950s: Residential Late 1950s – early 1970s: Western Broom 1975: Vacant Late 1970s – late 1990s: Laundry Equipment Sales 2000s - Present: auto repair
Union Auto 49/51 South Jeremy Street	1898 – mid 1970s: Residential 1980s - Present:: Residential/auto repair

* 834 West South Temple was formerly a portion of the former Creed Laboratories property at 15 South Jeremy Street

5.2 Historical Use Information on Adjoining Properties (to the extent identified)

Historic fire insurance maps and city directories indicate past uses of adjoining properties as a mix of older residential and commercial in nature, similar to those identified throughout the target property.

5.3 Physical Setting Source(s)

5.3.1 Topographic Map

The 1998 7.5 Minute Salt Lake City South, Utah, topographic map presented as Figure 4 in Appendix A depicts the area that includes Area N4. Area N4 is situated at an approximate elevation of 4,222 feet above mean sea level and is generally flat, with a general area gradient sloping gently to the west towards the Jordan River.

5.3.2 Regulatory Agency Files

Regulatory agency files reviewed for release sites within Area N4 indicated that groundwater in the area was encountered between 8 and 9 feet below ground surface with a general groundwater flow direction to the southwest.

5.4 Standard Environmental Record Sources, Federal and State

Environmental Data Resources, Inc., (EDR) has conducted government database research for the property (see Appendix D). Additional interviews with government agencies and follow-up information was provided as noted below. It should be understood that the databases may identify a site by the contact address of the company rather than the actual location of the activity being permitted or investigated. Plotted locations are approximated.

The results of the database search are summarized in Appendix D pages 4 and 5, Map Findings Summary.

5.4.1 Target Property

Multiple hazardous substance and/or petroleum release sites were identified in the database report that were located within the boundaries of Area N4. Facilities and sites identified in Area N4 are as follows:

- "Bullough Asbestos," located at 50 South 800 West (parcel number 15-02-229-022), currently Utah International Hostel/Autoquip, was identified by EDR as a Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) no further action planned (NFRAP) facility. We reviewed regulatory records regarding the Bullough facility at the Utah Division of Environmental Response and Remediation (DERR). Based on our review and on an interview with DERR project manager for the facility, Mr. Neil Taylor, "Bullough Asbestos" was an asbestos insulation storage and shipping facility. DERR performed a preliminary site visit at the facility in 2004. At the time of the visit, the property had been paved and the interior of the buildings had been cleaned by the new property owners. No soil samples were collected at the facility for asbestos analysis, and DERR found no information to suggest a release of asbestos at the facility. Subsequently, DERR recommended no further action at the facility.

- "Bullough Insulation" was also identified as a leaking underground storage tank (LUST) site. We reviewed regulatory records regarding the LUST at the Utah DERR. Based on our review, a release was identified during underground storage tank (UST) removal activities in 1993. The release was reported to be a result of a the lack of overfill prevention devices on two USTs (one 4,000-gallon unleaded gasoline tank and one 3,000-gallon leaded gasoline tank). Soil samples were collected at each end of the UST pit and analyzed for benzene, toluene, ethylbenzene, xylenes, and naphthalene (BTEXN) and total petroleum hydrocarbons (TPH). Analytical results indicated no concentrations of constituents analyzed were detected above regulatory cleanup levels. The LUST received regulatory closure in 1995 typically indicating that the reported release had been

addressed to the satisfaction of the overseeing regulatory agency. Documentation regarding this release is included in Appendix E.

- "Calder Brothers, Inc." located at 79 South 900 West (parcel number 15-02-205-009), currently Precision Aztec Motors, was identified as a LUST facility. We reviewed regulatory records regarding the LUST at DERR. A release was identified in 1992 during the removal of three USTs (one 10,000-gallon unleaded gasoline tank, one 5,000-gallon regular gasoline tank, and one 5,000-gallon diesel tank) and the associated dispenser. The release impacted soil and groundwater. Eleven groundwater monitoring wells were installed on and off-site between 1992 and 2003. In 2004, approximately 2,187 cubic yards of soil was removed from the southern half of the property and the residence adjacent to the east and disposed off-site. At the time of excavation, the groundwater in the excavation was treated with a shallow tray aeration system. Twelve confirmation soil samples were collected from the excavation and analyzed for methyl tert-butyl ether (MTBE), BTEXN, gasoline range organics (TPH-GRO), and diesel range organics (TPH-DRO). Numerous constituents were detected above regulatory cleanup levels in the samples collected. The excavation was backfilled with imported gravel mixed with 1,000 pounds of calcium peroxide. Quarterly groundwater monitoring of the monitoring wells is ongoing at the site. The most recent round of groundwater sampling for the site was performed in October 2009. Groundwater data collected during the 2009 round of sampling indicated a depth to groundwater ranging between 8 and 9 feet below ground surface with a general groundwater flow direction to the southwest. Analytical results indicated that two monitoring wells had concentrations of benzene concentrations ranging between 0.051 mg/L and 0.011 mg/L, above the Utah Initial Screening Level of 0.005 mg/L for benzene in groundwater. Documentation regarding this release is included in Appendix E.

- "Creed Laboratories" located at 15 South Jeremy Street (parcel number 15-02-205-009), currently Heritage Forge, was identified as a UST facility. We reviewed regulatory records regarding the LUST at DERR. Based on our review, two 2,000-gallon USTs were removed from the property in 1989. Soil samples collected at the time of UST removal activities were analyzed for BTEX and TPH. No concentrations of BTEX or TPH were detected in the samples collected. We have found no information to suggest a release from this UST.

  Creed Laboratories was also identified as a Resource Conservation and Recovery Act (RCRA) non-generator. We requested a review of regulatory files regarding the Creed facility at the Utah Division of Solid and Hazardous Waste (DSHW); however, the Creed Laboratories file had been archived. Several violations were identified for Creed Laboratories in the EDR report.

- EDR identified the Sprint facility located at 840 West South Temple as a UST facility. However, the facility is not located in Area N4 and is discussed in the report pertaining to Area N5.

- EDR identified "Crown Plating Company" located at 14 South Jeremy Street (parcel number 15-02-204-009) as a RCRA small quantity generator (SQG). We reviewed regulatory agency records regarding the RCRA-SQG status at the Utah DSHW. Based on our review, Crown Plating is a small metal parts plating facility that has been in operation since the 1960s. Waste streams generated at the facility include chromium plating sludge, nickel sludge laced with cyanide, and paint stripping waste. The facility has a waste water treatment system that is connected to the sanitary sewer. Waste water sludge is also considered a waste stream. Crown Plating has had numerous violations for improperly labeled, handled, and stored hazardous wastes, spills of solvents and other plating materials onto the floor of the plating rooms, corroded drums and containers of solvents and other constituents, and worker health and safety

violations. The most recent inspection of the facility was performed in 2007. DSHW inspectors did not identify any significant violations at the time of the inspection.

- EDR identified "Schovaers Electronics Corporation" located at 22 South Jeremy Street (parcel number 15-02-204-007) as a RCRA-SQG. EDR did not identify any violations for the Schovaers facility. We requested a review of regulatory files regarding the Schovaers at DSHW; however, they could not locate the Schovaers Electronics file.

5.4.2 Surrounding Area

Multiple hazardous substance and/or petroleum release sites were identified in the database report that are located within ASTM-specified approximate minimum search distances from the boundaries of Area N4. No facilities were identified to the south. Facilities and sites identified to the north, east, and west of Area N4 and within the blight study boundary are addressed in the respective blight study reports pertaining to those areas. We have found no information to suggest impacts to the target property from offsite sources.

5.5 Additional Environmental Record Sources

Lewis Young requested information from Salt Lake Valley Health Department (SLVHD) regarding any records of an environmental nature in the vicinity of Area N4, and provided us with a copy of the health department responses. According to the SLVHD, no records of an environmental nature are on file for Area N4.

We spoke with Ms. Constance Modrow with Salt Lake City Waste Water regarding any waste water discharge violations associated with Crown Plating. Ms. Modrow stated that Crown Plating has had numerous heavy metals violations in the past. The most recent violation was in March 2009, which was a pH violation indicating that the waste water treatment system at the facility was not working properly and could cause metals and cyanide to be released to the sewer. Since that time the violation has been addressed.

6. SITE RECONNAISSANCE

Wasatch environmental scientist Audra Heinzel conducted an unaccompanied site reconnaissance on May 29, 2010, and a site reconnaissance on June 1, 2010, accompanied by representatives from Lewis Young and the RDA of Salt Lake City. Site photographs are presented in Appendix B. Site reconnaissance checklists for each commercial property within Area N4 are included in Appendix F.

6.1 Methodology and Limiting Conditions

Our reconnaissance included observations of the approximate perimeter of Area N4, observations of accessible areas of the building perimeters of obvious commercial properties, and cursory observations of properties adjoining Area N4. Our site reconnaissance was limited to commercial properties within the study area unless Lewis Young and/or RDA personnel identified conditions on residential properties that indicated the presence or likely presence of hazardous substances or petroleum products. As prescribed in our scope of work approved by Lewis Young and the RDA, we did not enter any of the buildings.

6.2 General Observations

Area N4 is located in a mixed residential and commercial area. Major city roads traverse the perimeter and interior of the area as depicted in Figures presented in Appendix A.

As presented in Section 3.3, commercial businesses and their respective addresses observed at the time of our site reconnaissance are listed below:

Along South Temple

- 834 West: Pure Water Technologies (filtered water manufacturing)

Along 800 West

- 50 South: Utah International Hostel
- 48 South: Autoquip (automotive repair)

Along 100 South

- 834 West: Oasis Manufacturing (scaffolding manufacturer)

Along 900 West

- 79 South: Precision Aztec Motors (automotive repair and used car sales)
- 55/57 South: Charlie's Motor (automotive repair shop) and This & That Thrift Shop (retail)
- 47 South: Tropical Travel (travel agency)
- 35 South: El Compadre/Mutual Repair (automotive repair)
- 25 South: EPC International (polyurethane foam scrap recycler)
- 15 South: Superprā (carwash)

Along Jeremy Street

- 14 South: Crown Plating (plating)
- 15 South: Heritage Forge (decorative stone and iron wear manufacturer)
- 22 South: Schovaers Electrical (travel agency)
- 42 South: Liberty Auto and Mario's Auto (automotive repair)
- 49/51 South: Union Auto (automotive repair)

6.2.1 Underground Storage Tanks (USTs)

No USTs or UST vent pipes, fill pipes, or access ways indicating the presence of USTs were observed on properties within Area N4. As discussed in Section 5.4.1, USTs were previously located on the Utah International Hostel/Autoquip, Precision Aztec Motors, and Heritage Forge properties.

6.2.2 Aboveground Storage Tanks (ASTs)

Several ASTs were observed throughout Area 4. The observed ASTs are as follows:

Autoquip

- Two 250-gallon totes were observed in the storage yard on the west side of the Utah International Hostel/Autoquip property. We could not view the contents of the ASTs nor view the ground surrounding the ASTs.

Crown Plating

- One approximately 2,000-gallon AST was observed in the Crown Plating storage yard on the south side of the property building. No staining was observed on the asphalt surrounding the AST.

- One approximately 1,500-gallon AST was also observed in the Crown Plating storage yard. We could not view the contents of the AST nor view the ground surrounding the AST.

No other ASTs were observed on or adjoining to any properties within Area N4 or identified through records review.

6.2.3 Odors

A strong chemical odor was noted coming from the Crown Plating facility at the time of the site visit. No other strong, pungent, or noxious odors were noted on the commercial properties within Area N4, and none were identified through records review.

6.2.4 Drums and Containers

Numerous drums and containers were observed throughout Area N4. We were not able to view the contents of the drums and containers observed throughout Area N4 due to access limitations. The observed containers are as follows:

Precision Aztec Motors

- Seven 55-gallon drums were observed along the east side of the property. One drum contained oil filters. Significant oily staining was observed on the drums and on the soil surrounding the drums.

Mutual Repair

- Several drums and containers were observed in the shop portion of the property. Oily staining was observed on the exterior of the drums and containers.

- Five 55-gallon drums were observed along the north side of the property building. Oily staining was observed on the outside of the drums, on the wall of the building, and on the soil surrounding the drums.

Crown Plating

- Numerous 55-gallon drums were observed through the roll-up door on the east side of the property building. We were not able to view the contents of drums. The drums appeared degraded, and staining was observed on the outside of the drums.

- Several 55-gallon drums were observed in the storage yard on the south side of the property building. We were not able to view the contents of drums. The drums were stored on a wooden pallet and oily staining was observed on the exterior of the drums.

Schovaers Electronics

- Three 55-gallon drums were observed through the roll-up door on the east side of the property building. We were not able to view the contents of drums or the concrete surrounding the drums. The drums appeared to be in good condition.

6.2.5 PCB-Containing Equipment

One below-ground hoist was observed in the Precision Aztec Motors shop. Based on our experience, older underground hoists may contain hydraulic fluid containing PCBs. Further investigation would be necessary to determine if the hoist is hydraulic.

No other equipment suspected to contain PCBs was observed on the commercial properties within Area N4 and none were identified through records review.

6.2.6 Pits, Ponds, or Lagoons

No pits, ponds, or lagoons were observed on the commercial properties within Area N4, and none were identified through records review.

6.2.7 Stained Concrete, Pavements, and Soils

Numerous areas of soil and/or asphalt staining were observed throughout Area N4 at the following properties: Crown Plating, Mutual Repair, Union Auto, Mario's Auto, Liberty Auto, and Precision Aztec Motors.

6.2.8 Waste Water

No wastewater or other liquid was observed discharging into a drain, ditch, or stream on or adjoining to the commercial properties within Area N4. As discussed in Section 5.5, Crown Plating discharges treated waste water to the sanitary sewer and has had numerous violations in the past.

6.2.9 Sumps or Wells

One oil/water (OWS) separator was observed on the Superprā Carwash property. Six wash bay trench drains discharge to the OWS. No staining was observed around the OWS at the time of the site visit; however, standing water with an oily sheen was observed in each of the trench drains in the wash bays. According to historical research, various car washes have existed at the property since at least the 1950s.

Several monitoring wells were observed on and in the immediate vicinity of the Precision Aztec Motors property. As discussed in Section 5.4.1, groundwater monitoring of impacts to groundwater from a LUST at the property is ongoing.

6.2.10 Floor Drains

We did not enter any of the commercial buildings. Therefore, we have no information about the potential for floor drains inside the buildings.

6.2.11 Solid Waste

Trash, automobiles, automotive parts, and tires were observed in the storage yard of the Autoquip property. We could not view the ground surrounding the trash, etc., for indications of staining.

Trash, concrete debris, and a small pile of soil was observed at the northeast corner of the Superprā Carwash property. No staining was observed on the asphalt surrounding the trash, soil, and debris.

Numerous discarded chemical containers were observed along the north side of the Crown Plating building. The containers were on top of a pile of scrap metal. No staining was observed on the concrete around the scrap metal or containers.

6.2.12 Stressed Vegetation

No stressed vegetation was observed on the commercial properties within Area N4, and none were identified through records review.

7. INTERVIEWS WITH CURRENT PROPERTY OWNERS/OCCUPANTS

As prescribed in our scope of work approved by Lewis Young and the RDA, we did not actively seek interviews with any of the property owners or occupants within the study area. Interviews were only conducted if initiated by the property owner or occupant, or on occasion when Wasatch personnel were seeking additional information regarding a specific concern identified during our site reconnaissance. No interviews were conducted with property owners or occupants of Area N4.

8. FINDINGS AND OPINIONS

Area N4 is located within a mixed commercial and residential area bounded by South Temple to the north, 100 South to the south, 800 West to the east, and 900 West to the west. Jeremy Street extends north to south through the central portion of the target property. Our research, to the extent available, indicates that Area N4 was historically residential from the 1890s to the 1940s when commercial development began.

Precision Aztec Motors (parcel number 15-02-205-009) has been occupied by various automotive repair and fueling stations since the mid 1950s. At the time of our site visit, one below-ground hoist was observed in the shop, numerous areas of soil and asphalt staining were observed, and several drums were observed that were in poor condition with staining observed on the drums and ground surrounding the drums. Additionally, the Precision property was previously occupied by Calder Brothers and is identified as an open LUST facility. A release was identified in 1992 during the removal of three USTs and the associated dispensers and piping. Eleven groundwater monitoring wells were installed on and off-site between 1992 and 2003. In 2004, additional soil and groundwater remediation was conducted at the property and the residence adjacent to the east. Confirmation soil samples identified numerous petroleum hydrocarbon constituents above regulatory cleanup levels. The excavation was backfilled with imported gravel mixed with 1,000 pounds of calcium peroxide. Quarterly groundwater monitoring is ongoing at the site. October 2009 groundwater analytical results indicated that two monitoring wells had concentrations of benzene above the Utah Initial Screening Level of 0.005 mg/L for benzene in groundwater.

Crown Plating (parcel numbers 15-02-204-009 and 15-02-204-006) is a plating operation that has operated at this location since the 1960s. Crown Plating was identified as a RCRA-SQG and has had numerous violations for improperly labeled, handled, and stored hazardous wastes, spills of solvents and other plating materials onto the floor of the plating rooms, corroded drums and containers of solvents and other constituents, and worker health and safety violations. Crown Plating also has had numerous waste water discharge violations. At the time of our site visit, numerous areas of asphalt staining were observed, and several drums were observed that were in poor condition with staining observed on the drums and ground surrounding the drums. Additionally, excessive amounts of trash including chemical containers and scrap metal were observed on the property.

Superprā Carwash (parcel numbers 15-02-204-001, 15-02-204-002, 15-02-204-003, and 15-02-204-008) has been occupied by various car washes since the 1950s. At the time of our site visit, one oil/water (OWS) separator was observed, and six wash bay trench drains discharged to the OWS. No staining was

observed around the OWS at the time of the site visit; however, standing water with an oily sheen was observed in each of the trench drains in the wash bays. Additionally, excessive amounts of trash and a soil stockpile were observed on the property. Based on the length of time that the property has been a carwash facility and on the oily sheen observed on the water in each wash bay, there is a potential that releases of petroleum products or hazardous substances has occurred at the property.

In addition to the properties discussed above, numerous drums and containers and areas of soil and asphalt staining were observed on the Mutual Repair, Union Auto, Mario's Auto, and Liberty Auto properties (parcel numbers 15-02-229-002, 15-02-205-002, 15-02-205-005, 15-02-205-014, and 05-02-229-003). Additionally, excessive amounts of trash, including automobiles, automotive parts and tires, chemical containers, scrap metal, and a soil stockpile were observed at the Autoquip property.

Utah International Hostel/Autoquip (parcel number 12-02-229-022) was formerly occupied by "Bullough Asbestos" and was identified as both a CERCLIS NFRAP facility and a LUST site. With respect to the LUST listing, a petroleum release was identified during UST removal activities in 1993. The release was a result of a lack of overfill prevention devices on two USTs. However, no petroleum hydrocarbon constituents were identified above laboratory detection limits during UST removal activities and no release was confirmed. With respect to the CERCLIS listing, "Bullough Asbestos" was an asbestos insulation storage and shipping facility, and the Utah DERR performed a preliminary site visit at the facility in 2004. At the time of the DERR visit, the property had been paved and the interior of the buildings had been cleaned by the new property owners. DERR found no information to suggest a release of asbestos at the facility and recommended no further action. However, no soil samples were collected at the facility for asbestos analysis. Given the historical use of the property as an asbestos insulation storage and shipping facility, there is potential for the presence of asbestos that may require corrective action during redevelopment activities.

Heritage Forge (parcel number 15-02-226-002) was previously occupied by Creed Laboratories, a chemical manufacturing facility, between at least the early 1960s and the 1990s. Creed Laboratories was identified as a UST facility. The UST has been removed and we have found no information to suggest a release from this UST. Creed Laboratories was also identified as a RCRA non-generator. Several violations were identified for Creed Laboratories in the EDR report and we requested a review of regulatory files regarding the Creed facility; however, the Creed Laboratories file had been archived. Given the historical use as a chemical manufacturer, a history of agency violations, and the lack of agency file information, there is potential for releases from the Creed facility.

Schovaers Electronics (parcel number 15-02-204-007) was identified as a RCRA-SQG. We requested a review of regulatory files regarding the facility; however, the Schovaers Electronics file could not be located. There may be information in the agency file records material to recognized environmental conditions that we were unable to obtain.

Charlie's Motors/This & That Thrift Shop (parcel number 15-02-205-004) was occupied by Pencock Pest Control between 1975 and 1998. Given the current use as an auto repair shop and past use as a pest control company, there is potential for releases at this facility.

Multiple hazardous substance and/or petroleum release sites were identified within ASTM-specified approximate minimum search distances from the boundaries of Area N4. Facilities and sites identified to the north, south, east, and west of Area N4 and the blight study boundary are addressed in the respective blight study reports pertaining to those areas. We have found no information to suggest impacts to Area N4 from off-site sources.

9. CONCLUSIONS

We have performed a Phase I Environmental Site Assessment in general conformance with the scope and limitations of ASTM E 1527-05 of the RDA Blight Study Area N4, located between South Temple and 100 South and 800 West and 900 West, in Salt Lake City, Utah. Any exceptions to, or deletions from, this

practice are described in Section 2 of this report. We have found no information to suggest recognized environmental conditions in connection with Area N4 except the following. Figure 7 outlines the parcel areas where recognized environmental conditions have been identified.

- Precision Aztec Motors (parcel number 15-02-205-009) is an open LUST site. Additionally, this property has been occupied by various automotive repair and fueling stations since the mid 1950s. At the time of our site visit, one below-ground hoist was observed in the shop, numerous areas of soil and asphalt staining were observed, and several drums were observed that were in poor condition with staining observed on the drums and ground surrounding the drums.

- Crown Plating (parcel numbers 15-02-204-009 and 15-02-204-006) is a plating operation that has operated at this location since the 1960s. Crown Plating is a regulated hazardous waste generator and has had numerous violations related to improper handling, storage, and discharge of hazardous wastes. At the time of our site visit, numerous areas of asphalt staining were observed, and several drums were observed that were in poor condition with staining observed on the drums and ground surrounding the drums.

- Superprā Carwash (parcel numbers 15-02-204-001, 15-02-204-002, 15-02-204-003, and 15-02-204-008) has been occupied by various car washes since the 1950s. At the time of our site visit, one oil/water separator (OWS) was observed, and six wash bay trench drains discharged to the OWS. No staining was observed around the OWS at the time of the site visit; however, standing water with an oily sheen was observed in each of the trench drains in the wash bays. Additionally, excessive amounts of trash and a soil stockpile were observed on the property. Based on the length of time that the property has been a carwash facility and on the oily sheen observed on the water in each wash bay, there is a potential that releases of petroleum products or hazardous substances has occurred at the property.

- In addition to the properties discussed above, numerous drums and containers and areas of soil and asphalt staining were observed on the Mutual Repair, Union Auto, Mario's Auto, and Liberty Auto properties (parcel numbers 15-02-229-002, 15-02-205-002, 15-02-205-005, 15-02-205-014, and 15-02-229-003). Additionally, excessive amounts of trash, including automobiles, automotive parts and tires, chemical containers, scrap metal, and a soil stockpile were observed at the Autoquip property.

- Utah International Hostel/Autoquip (parcel number 15-02-229-022) was formerly occupied by "Bullough Asbestos," an asbestos insulation storage and shipping facility. Given the historical use of the property as an asbestos insulation storage and shipping facility, there is potential for the presence of asbestos that may require corrective action during redevelopment activities.

- Heritage Forge (parcel number 15-02-226-002) was previously occupied by Creed Laboratories, a chemical manufacturer. Given the historical use as a chemical manufacturer and a history of agency violations, there is potential for releases from the Creed facility.

- Schovaers Electronics (parcel number 15-02-204-007) was identified as a RCRA-SQG. We requested a review of regulatory files regarding the facilities; however, the Schovaers Electronics file could not be located. There may be information in the agency file records material to recognized environmental conditions that we were unable to obtain.

- Charlie's Motors/This & That Thrift Shop (parcel number 15-02-205-004) was occupied by Pencock Pest Control between 1975 and 1998. Given the current use as an auto repair shop and past use as a pest control company, there is potential for releases at this facility.

This report is based on our review of available historical and environmental records; visual observations of the surface of the target property and adjoining properties; and personal interviews with available persons having knowledge of the property. Sections 8 and 9 of the report, Findings and Opinions, and Conclusions are considered an Executive Summary and should be reviewed in conjunction with the entire report.

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in 312.10 of 40 CFR 312 and have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the target property. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

WASATCH ENVIRONMENTAL, INC.

Audra Heinzel
Environmental Scientist

Julie Kilgore, Principal
Environmental Manager

Copies: (1) Electronic Upload

Table 2
Parcel Numbers and Addresses Included within Area N4

Parcel ID	Property Type	Property Location
15022040010000	914	15 S 900 W
15022040020000	518	869 W SOUTHTEMPLE ST
15022040030000	914	869 W SOUTHTEMPLE ST
15022040040000	594	25 S 900 W
15022040060000	550	14 S JEREMY ST
15022040070000	550	22 S JEREMY ST
15022040080000	914	855 W SOUTHTEMPLE ST
15022040090000	915	8 S JEREMY ST
15022050020000	511	47 S 900 W
15022050040000	503	55 S 900 W
15022050050000	537	42 S JEREMY ST
15022050060000	993	48 S JEREMY ST
15022050070000	111	54 S JEREMY ST
15022050080000	111	64 S JEREMY ST
15022050090000	537	79 S 900 W
15022050100000	111	872 W 100 S
15022050110000	111	864 W 100 S
15022050120000	203	860 W 100 S
15022050130000	103	850 W 100 S
15022050140000	203	35 S 900 W
15022260010000	590	11 S JEREMY ST
15022260020000	550	15 S JEREMY ST
15022260030000	902	821 W SOUTHTEMPLE ST
15022260040000	511	817 W SOUTHTEMPLE ST
15022260050000	951	4 S 800 W
15022260060000	993	10 S 800 W
15022260070000	915	16 S 800 W
15022290020000	511	49 S JEREMY ST
15022290030000	537	51 S JEREMY ST
15022290070000	111	52 S 800 W
15022290090000	111	60 S 800 W
15022290100000	111	66 S 800 W
15022290130000	111	826 W 100 S
15022290140000	111	824 W 100 S
15022290150000	997	818 W 100 S
15022290160000	111	806 W 100 S
15022290170000	111	804 W 100 S
15022290180000	594	834 W 100 S
15022290210000	111	54 S 800 W
15022290220000	203	50 S 800 W
15025040950000	955	28 S 800 W # APXBT

APPENDIX D
ENVIRONMENTAL DATABASE INFORMATION

Crown Plating and Schovaers Electronics
8, 14, and 22 South Jeremy Street
Salt Lake City, UT 84104

Inquiry Number: 4281472.2s
May 01, 2015

The EDR Radius Map™ Report

EDR® Environmental Data Resources Inc

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

8, 14, AND 22 SOUTH JEREMY STREET
SALT LAKE CITY, UT 84104

COORDINATES

Latitude (North):	40.7688000 - 40° 46' 7.68''
Longitude (West):	111.9158000 - 111° 54' 56.88''
Universal Tranverse Mercator:	Zone 12
UTM X (Meters):	422708.8
UTM Y (Meters):	4513284.0
Elevation:	4233 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	40111-G8 SALT LAKE CITY NORTH, UT
Most Recent Revision:	2001

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20110720
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
8, 14, AND 22 SOUTH JEREMY STREET
SALT LAKE CITY, UT 84104

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
A1	SCHOVAERS ELECTRONIC	22 JEREMY	CA HAZNET		TP
A2	CROWN PLATING CO. IN	14 JEREMY STREET	RCRA-SQG, FINDS, US AIRS		TP
A3	SCHOVAERS ELECTRONIC	22 JEREMY STREET	RCRA-SQG		TP
A4	CROWN PLATING CO., I	14 JEREMY ST.	FTTS, HIST FTTS		TP
A5	SCHOVAERS ELECTRONIC	22 JEREMY	FINDS		TP
A6	CROWN PLATING CO, IN	14 JEREMY ST.	UT NPDES		TP
Reg	UTAH POWER & LIGHT/A	600 W SOUTH TEMPLE	NPL, CERCLIS, US ENG CONTROLS, US INST CONTROL,...	Same	2063, 0.391, East
A7	CREED LABORATORIES	15 JERMEY STREET	ICIS, FINDS, UT UST	Lower	67, 0.013, NE
A8	CREED LABORATORIES &	15 JEREMY	RCRA NonGen / NLR	Lower	67, 0.013, NE
A9	LAUNDRY EQUIPMENT PA	42 JEREMY ST	EDR US Hist Cleaners	Higher	115, 0.022, SSE
A10	SERVICE SALES CO WHO	15 S 9TH WEST ST	EDR US Hist Auto Stat	Lower	119, 0.023, WNW
11	SPRINT P.O.P.	840 W SOUTH TEMPLE	UT UST, UT TIER 2, UT Financial Assurance	Lower	134, 0.025, NNE
12		51 JEREMY ST	EDR US Hist Auto Stat	Higher	177, 0.034, SSE
B13		35 S 900 W	EDR US Hist Auto Stat	Higher	223, 0.042, WSW
C14	TONYS AUTOMOTIVE GEN	872 SOUTH TEMPLE ST	EDR US Hist Auto Stat	Lower	250, 0.047, NNW
C15		1 N 900 W	EDR US Hist Auto Stat	Lower	276, 0.052, NW
B16	FAMILY DOLLAR	50 N 900 W	UT LUST, UT UST	Higher	277, 0.052, SW
C17		15 N 900 W	EDR US Hist Auto Stat	Lower	374, 0.071, NW
C18		867 EMERIL AVE	EDR US Hist Auto Stat	Lower	380, 0.072, North
D19		79 S 900 W	EDR US Hist Auto Stat	Higher	415, 0.079, SSW
D20	CALDER BROS. CO, INC	79 S 900 W	UT LUST, UT UST	Higher	415, 0.079, SSW
E21	FLASH GORDON TRANSMI	1 N 8TH WEST ST	EDR US Hist Auto Stat	Lower	423, 0.080, ENE
22		920 W SOUTH TEMPLE	EDR US Hist Auto Stat	Lower	431, 0.082, WNW
F23	BULLOUGH INSULATION	50 S 800 W	UT LUST, UT UST	Higher	444, 0.084, ESE
F24	MELS LAUNDROMAT	56 S 8TH WEST ST	EDR US Hist Cleaners	Higher	461, 0.087, SE
D25	EXCELLENT CLNS	880 W 1ST N	EDR US Hist Cleaners	Higher	477, 0.090, SSW
D26	EXCELLENT CLEANEIS	880 W 1ST NORTH ST	EDR US Hist Cleaners	Higher	477, 0.090, SSW
D27	VOGUE COMMERCIAL & I	906 S 1ST WEST ST	EDR US Hist Cleaners	Higher	522, 0.099, SSW
D28	VOGUE CLQ & SHIRT LN	906 S 1ST W	EDR US Hist Cleaners	Higher	522, 0.099, SSW
D29	CHICAGO CLNG CO	902 S 1ST W	EDR US Hist Cleaners	Higher	522, 0.099, SSW
D30	PARAMOUNT CLNRS & DY	902 S 1ST WEST ST	EDR US Hist Cleaners	Higher	522, 0.099, SSW
E31	MADSEN BOYD GARAGE A	10 N 8TH WEST ST	EDR US Hist Auto Stat	Lower	524, 0.099, ENE
F32	SUGDEN W L AUTO REPR	47 S 8TH WEST ST	EDR US Hist Auto Stat	Higher	548, 0.104, ESE
F33	BRUCE HUSKEY	79 S 8TH WEST ST	EDR US Hist Auto Stat	Higher	580, 0.110, SE
G34	SMETHURST LEONARD S	947 FOLSOM AVE	EDR US Hist Auto Stat	Lower	604, 0.114, WSW
D35	ALLEN CLEANERS	909 S 1ST W	EDR US Hist Cleaners	Higher	609, 0.115, SSW
D36	HANSEN HOME CLEANING	911 S 1ST W	EDR US Hist Cleaners	Higher	609, 0.115, SSW
H37	ALOHA CLEANERS	802 W 1ST SOUTH ST	EDR US Hist Cleaners	Higher	612, 0.116, SE
E38	PROGRESSIVE PLATING	777 WEST SOUTH TEMPL	RCRA-CESQG	Lower	619, 0.117, ENE

MAPPED SITES SUMMARY

Target Property Address:
8, 14, AND 22 SOUTH JEREMY STREET
SALT LAKE CITY, UT 84104

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
G39		955 FOLSOM AVE	EDR US Hist Auto Stat	Lower	664, 0.126, WSW
F40	HICKEYS PHILLIPS 66	776 E 1ST S	EDR US Hist Auto Stat	Higher	680, 0.129, SE
F41	TEXAS CO SER STA	776 E 1ST SOUTH ST	EDR US Hist Auto Stat	Higher	680, 0.129, SE
42	JEREMY STREET LLC	123 S JEREMY ST (84	UT LUST, UT UST	Higher	683, 0.129, South
F43	EAST SIDE GARAGE	774 E 1ST S	EDR US Hist Auto Stat	Higher	697, 0.132, SE
F44	PETERSEN REED B FILL	774 E 1ST SOUTH ST	EDR US Hist Auto Stat	Higher	697, 0.132, SE
H45	MARSHON LAUNDRY SUPP	132 S 800 WEST ST	EDR US Hist Cleaners	Higher	708, 0.134, SSE
I46	WILFS CONOCO SERV GA	875 N TEMPLE WEST	EDR US Hist Auto Stat	Lower	730, 0.138, North
47	TABCO	940 WEST 100 SOUTH	RCRA NonGen / NLR	Higher	730, 0.138, SW
I48	SANITARY CLEANERS	71 N 9TH W	EDR US Hist Cleaners	Lower	735, 0.139, NNW
J49	OPOULOS AUTOMOTIVE &	741 SOUTH TEMPLE ST	EDR US Hist Auto Stat	Lower	781, 0.148, East
H50	CITY CAB CO.	710 W 100 S	UT LUST, UT UST	Higher	786, 0.149, SE
J51		741 W SOUTH TEMPLE	EDR US Hist Auto Stat	Lower	798, 0.151, ENE
I52	DAVID EARLY #5	875 W NORTH TEMPLE	UT LUST, UT UST	Lower	864, 0.164, North
I53	DAVID EARLY TIRE	875 WEST NORTH TEMPL	RCRA NonGen / NLR, FINDS	Lower	864, 0.164, North
I54		875 W NORTH TEMPLE	EDR US Hist Auto Stat	Lower	864, 0.164, North
I55	CHEVRON USA 72184 RO	880 WEST NORTH TEMPL	RCRA NonGen / NLR, FINDS	Lower	883, 0.167, North
K56	CHIPMAN FILLING STA	905 N TEMPLE WEST	EDR US Hist Auto Stat	Lower	893, 0.169, NNW
J57	CARTOW	738 W SOUTH TEMPLE	UT LUST, UT UST	Lower	898, 0.170, ENE
J58	CLEARWATER TRUCKING	738 W S TEMPLE	RCRA NonGen / NLR	Lower	898, 0.170, ENE
I59	SMITH'S GAS & VIDEO	905 WEST NORTH TEMPL	UT LUST, UT UST	Lower	920, 0.174, NNW
I60		905 W NORTH TEMPLE	EDR US Hist Auto Stat	Lower	920, 0.174, NNW
L61	NENOW HERB SERV STA	180 S 8TH W	EDR US Hist Auto Stat	Higher	925, 0.175, SSE
L62	CLIFFS AMERICAN OIL	180 S 8TH WEST ST	EDR US Hist Auto Stat	Higher	925, 0.175, SSE
63	STAR LAUNDRY	151 W 9TH SOUTH ST	EDR US Hist Cleaners	Higher	941, 0.178, South
K64		910 W NORTH TEMPLE	EDR US Hist Cleaners	Lower	952, 0.180, NNW
K65	CENTURY LAUNDRY	910 WEST NORTH TEMPL	UT DRYCLEANERS	Lower	952, 0.180, NNW
K66	NENOWS HERB SERVICE	935 N TEMPLE WEST	EDR US Hist Auto Stat	Lower	961, 0.182, NW
67		25 S 1000 W	EDR US Hist Auto Stat	Lower	991, 0.188, West
K68	M. KENT FOOTE	935 W NORTH TEMPLE	UT LUST, UT UST	Lower	1088, 0.206, NW
M69	STAR SERVICE PETROLE	955 N TEMPLE WEST	EDR US Hist Auto Stat	Lower	1092, 0.207, NW
K70	QUALITY OIL CO SER S	980 NORTH TEMPLE ST	EDR US Hist Auto Stat	Lower	1122, 0.213, NNW
M71	BROWN LEE CLEANERS	963 N TEMPLE WEST	EDR US Hist Cleaners	Lower	1134, 0.215, NW
N72	MINIT-LUBE #1020	757 W NORTH TEMPLE	UT LUST, UT UST	Lower	1148, 0.217, NE
N73	MINIT-LUBE #1020	757 WEST NORTH TEMPL	RCRA NonGen / NLR, FINDS	Lower	1148, 0.217, NE
N74		757 W NORTH TEMPLE	EDR US Hist Auto Stat	Lower	1148, 0.217, NE
M75	RED HANGER INC # 12	955 WEST NORTH TEMPL	RCRA NonGen / NLR, FINDS	Lower	1180, 0.223, NW
M76		955 W NORTH TEMPLE	EDR US Hist Cleaners	Lower	1180, 0.223, NW
M77	7-ELEVEN 1851-24573	960 W NORTH TEMPLE	UT LUST, UT UST, UT Financial Assurance	Lower	1198, 0.227, NW

MAPPED SITES SUMMARY

Target Property Address:
8, 14, AND 22 SOUTH JEREMY STREET
SALT LAKE CITY, UT 84104

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
O78	FRESH MARKET 2383	140 NORTH 900 WEST	UT LUST, UT UST, UT Financial Assurance	Lower	1218, 0.231, NNW
79	VIA WEST	118 S 1000 W	UT UST, UT Financial Assurance	Lower	1230, 0.233, SW
O80	RITE AID #6137	150 NORTH 900 WEST	RCRA-SQG	Lower	1292, 0.245, NNW
81	VOGUE CLEANING & SHI	906 WEST 2ND SOUTH	UT DRYCLEANERS	Higher	1319, 0.250, SSW
82	WONDER HOSTESS BAKER	708 W NORTH TEMPLE	UT LUST, UT UST	Higher	1395, 0.264, NE
83	OLD GAS STATION	180 S 1000 W	UT LUST, UT UST	Lower	1540, 0.292, SW
P84	S.L. NORTH SERVICE S	1070 W 100 S	UT LUST, UT UST	Lower	1620, 0.307, WSW
P85	MOUNTAIN FUELS SUPPL	100 SOUTH 1078 WEST	CERC-NFRAP	Lower	1680, 0.318, WSW
86	GRANITE MILL IND. CO	1055 W NORTH TEMPLE	UT LUST, UT UST	Lower	1681, 0.318, WNW
P87	MOUNTAIN FUELS SUPPL	1078 W 100 SOUTH	EDR MGP	Lower	1691, 0.320, WSW
88	EIMCO PROCESS EQUIPM	669 W 200 S	UT LUST, UT UST, UT NPDES	Lower	1883, 0.357, SE
Q89	AIRPORT TRAX 650 WES	650 W NORTH TEMPLE	UT LUST, UT UST	Higher	1895, 0.359, ENE
Q90	FORMER RANCHO LANES	641 WEST NORTH TEMPL	UT LAST	Higher	1981, 0.375, ENE
R91	UTAH POWER AND LIGHT	600 W SOUTH TEMPLE	UT INST CONTROL	Higher	2001, 0.379, East
R92	UTAH POWER AND LIGHT	600 W SOUTH TEMPLE	EDR MGP	Higher	2001, 0.379, East
93	MYERS CONTAINER CORP	49 SOUTH 600 WEST	CORRACTS, RCRA NonGen / NLR	Higher	2033, 0.385, East
R94	DESERET PAINT	14 N. 600 W.	CERC-NFRAP	Higher	2061, 0.390, ENE
95	QUESTAR REGULATED SE	1175 W 130 S	UT LUST, UT UST	Lower	2171, 0.411, WSW
S96	UTA - CENTRAL DIVISI	610 W 200 S	UT LUST, UT UST, UT Financial Assurance	Higher	2246, 0.425, SE
T97	MARK STEEL	751 W 300 S	UT LUST, UT UST	Lower	2323, 0.440, SSE
T98	GENEVA ROCK PRODUCTS	748 W 300 S	UT LUST, UT UST, UT Financial Assurance	Lower	2330, 0.441, SSE
T99	NOYCE TRANSFER CO	736 W 300 S	UT LUST, UT UST	Lower	2336, 0.442, SSE
S100	SALT LAKE CITY INTER	600 WEST 200 SOUTH	UT VCP	Higher	2351, 0.445, ESE
101	AMERICAN BARREL COMP	600 WEST NORTH TEMPL	CORRACTS, RCRA-CESQG, ICIS, FINDS	Higher	2433, 0.461, ENE
102	S.L.C. FIRE DEPT. ST	273 N 1000 W	UT LUST, UT UST	Lower	2477, 0.469, NNW

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 8 of the attached EDR Radius Map report:

Site	Database(s)	EPA ID
SCHOVAERS ELECTRONIC 22 JEREMY SALT LAKE CITY, UT 84104	CA HAZNET GEPAID: UTD085325769	N/A
CROWN PLATING CO. IN 14 JEREMY STREET SALT LAKE CITY, UT 84104	RCRA-SQG EPA ID:: UTD009086372 FINDS Registry ID:: 110002159789 US AIRS EPA plant ID:: 110002159789	UTD009086372
SCHOVAERS ELECTRONIC 22 JEREMY STREET SALT LAKE CITY, UT 84104	RCRA-SQG EPA ID:: UTD085325769	UTD085325769
CROWN PLATING CO., I 14 JEREMY ST. SALT LAKE CITY, UT 84104	FTTS HIST FTTS	N/A
SCHOVAERS ELECTRONIC 22 JEREMY SALT LAKE CITY, UT 84104	FINDS Registry ID:: 110010918999	N/A
CROWN PLATING CO, IN 14 JEREMY ST. SALT LAKE CITY, UT 84104	UT NPDES Permit: UTR000378	N/A

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

Proposed NPL..... Proposed National Priority List Sites

NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State- and tribal - equivalent CERCLIS

UT SHWS ---------- This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State and tribal landfill and/or solid waste disposal site lists

UT SWF/LF ---------- List of Landfills

State and tribal leaking storage tank lists

INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

UT AST ---------- Listing of Aboveground Storage Tanks
INDIAN UST ---------- Underground Storage Tanks on Indian Land
FEMA UST ---------- Underground Storage Tank Listing

State and tribal voluntary cleanup sites

INDIAN VCP ---------- Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

UT BROWNFIELDS ---------- Brownfields Assessment Sites Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

EXECUTIVE SUMMARY

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9 ---- Torres Martinez Reservation Illegal Dump Site Locations
ODI ---- Open Dump Inventory
INDIAN ODI ---- Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ---- Clandestine Drug Labs
UT CDL ---- Methamphetamine Contaminated Properties Listing
US HIST CDL ---- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---- CERCLA Lien Information

Records of Emergency Release Reports

HMIRS ---- Hazardous Materials Information Reporting System
UT SPILLS ---- Spills Data
UT SPILLS 90 ---- SPILLS 90 data from FirstSearch

Other Ascertainable Records

DOT OPS ---- Incident and Accident Data
DOD ---- Department of Defense Sites
FUDS ---- Formerly Used Defense Sites
UMTRA ---- Uranium Mill Tailings Sites
US MINES ---- Mines Master Index File
TRIS ---- Toxic Chemical Release Inventory System
TSCA ---- Toxic Substances Control Act
SSTS ---- Section 7 Tracking Systems
PADS ---- PCB Activity Database System
MLTS ---- Material Licensing Tracking System
RADINFO ---- Radiation Information Database
RAATS ---- RCRA Administrative Action Tracking System
RMP ---- Risk Management Plans
UT UIC ---- UIC Site Location Listing
INDIAN RESERV ---- Indian Reservations
SCRD DRYCLEANERS ---- State Coalition for Remediation of Drycleaners Listing
UT FUDS ---- Formerly Used Defense Sites
UT UOPF ---- Used Oil Permitted Facilities
UT EWA ---- Enforceable Written Assurances
UT MMRP ---- Military Munitions Response Program
US FIN ASSUR ---- Financial Assurance Information
LEAD SMELTERS ---- Lead Smelter Sites
EPA WATCH LIST ---- EPA WATCH LIST
2020 COR ACTION ---- 2020 Corrective Action Program List
COAL ASH EPA ---- Coal Combustion Residues Surface Impoundments List
COAL ASH DOE ---- Steam-Electric Plant Operation Data
PCB TRANSFORMER ---- PCB Transformer Registration Database

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

UT RGA LUST ---- Recovered Government Archive Leaking Underground Storage Tank

EXECUTIVE SUMMARY

UT RGA LF..... Recovered Government Archive Solid Waste Facilities List

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the U.S. EPA.

A review of the NPL list, as provided by EDR, and dated 12/16/2014 has revealed that there is 1 NPL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
UTAH POWER & LIGHT/A	***600 W SOUTH TEMPLE***	***E 1/4 - 1/2 (0.391 mi.)***	***0***	***23***

Federal CERCLIS list

CERCLIS: The Comprehensive Environmental Response, Compensation and Liability Information System contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

A review of the CERCLIS list, as provided by EDR, and dated 10/25/2013 has revealed that there is 1 CERCLIS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
UTAH POWER & LIGHT/A	***600 W SOUTH TEMPLE***	***E 1/4 - 1/2 (0.391 mi.)***	***0***	***23***

EXECUTIVE SUMMARY

Federal CERCLIS NFRAP site List

CERC-NFRAP: Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

A review of the CERC-NFRAP list, as provided by EDR, and dated 10/25/2013 has revealed that there are 2 CERC-NFRAP sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DESERET PAINT	14 N. 600 W.	ENE 1/4 - 1/2 (0.390 mi.)	R94	105
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
MOUNTAIN FUELS SUPPL	100 SOUTH 1078 WEST	WSW 1/4 - 1/2 (0.318 mi.)	P85	94

Federal RCRA CORRACTS facilities list

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 12/09/2014 has revealed that there are 2 CORRACTS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MYERS CONTAINER CORP	***49 SOUTH 600 WEST***	***E 1/4 - 1/2 (0.385 mi.)***	***93***	***98***
AMERICAN BARREL COMP	***600 WEST NORTH TEMPL***	***ENE 1/4 - 1/2 (0.461 mi.)***	***101***	***109***

Federal RCRA generators list

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 12/09/2014 has revealed that there is 1 RCRA-SQG site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
RITE AID #6137	150 NORTH 900 WEST	NNW 1/8 - 1/4 (0.245 mi.)	O80	90

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 12/09/2014 has revealed that there is 1 RCRA-CESQG site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
PROGRESSIVE PLATING	777 WEST SOUTH TEMPL	ENE 0 - 1/8 (0.117 mi.)	E38	63

Federal institutional controls / engineering controls registries

US ENG CONTROLS: A listing of sites with engineering controls in place.

A review of the US ENG CONTROLS list, as provided by EDR, and dated 09/18/2014 has revealed that there is 1 US ENG CONTROLS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
UTAH POWER & LIGHT/A	***600 W SOUTH TEMPLE***	***E 1/4 - 1/2 (0.391 mi.)***	***0***	***23***

US INST CONTROL: A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

A review of the US INST CONTROL list, as provided by EDR, and dated 09/18/2014 has revealed that there is 1 US INST CONTROL site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
UTAH POWER & LIGHT/A	***600 W SOUTH TEMPLE***	***E 1/4 - 1/2 (0.391 mi.)***	***0***	***23***

State and tribal leaking storage tank lists

UT LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environmental Quality's Potential Leaking UST Sites.

A review of the UT LUST list, as provided by EDR, and dated 01/20/2015 has revealed that there are 24 UT LUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FAMILY DOLLAR Date Closed: 11/04/2013 Facility ID: 4002469	***50 N 900 W***	***SW 0 - 1/8 (0.052 mi.)***	***B16***	***55***
CALDER BROS. CO, INC Date Closed: 01/12/2011 Facility ID: 4000119	***79 S 900 W***	***SSW 0 - 1/8 (0.079 mi.)***	***D20***	***58***

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BULLOUGH INSULATION Date Closed: 05/09/1995 Facility ID: 4001968	***50 S 800 W***	***ESE 0 - 1/8 (0.084 mi.)***	***F23***	***59***
JEREMY STREET LLC Date Closed: 04/10/2013 Facility ID: 4001850	***123 S JEREMY ST (84***	***S 1/8 - 1/4 (0.129 mi.)***	***42***	***66***
CITY CAB CO. Date Closed: 08/30/2007 Facility ID: 4001593	***710 W 100 S***	***SE 1/8 - 1/4 (0.149 mi.)***	***H50***	***69***
WONDER HOSTESS BAKER Date Closed: 06/19/2006 Facility ID: 4000190	***708 W NORTH TEMPLE***	***NE 1/4 - 1/2 (0.264 mi.)***	***82***	***92***
AIRPORT TRAX 650 WES Date Closed: 03/14/2011 Facility ID: 4002453	***650 W NORTH TEMPLE***	***ENE 1/4 - 1/2 (0.359 mi.)***	***Q89***	***97***
UTA - CENTRAL DIVISI Date Closed: 01/03/1996 Date Closed: 02/04/2002 Date Closed: 04/05/2010 Facility ID: 4001132	***610 W 200 S***	***SE 1/4 - 1/2 (0.425 mi.)***	***S96***	***106***

Lower Elevation	Address	Direction / Distance	Map ID	Page
DAVID EARLY #5 Date Closed: 11/20/2013 Facility ID: 4001899	***875 W NORTH TEMPLE***	***N 1/8 - 1/4 (0.164 mi.)***	***I52***	***69***
CARTOW Date Closed: 07/17/2002 Facility ID: 4000179	***738 W SOUTH TEMPLE***	***ENE 1/8 - 1/4 (0.170 mi.)***	***J57***	***75***
SMITH'S GAS & VIDEO Facility ID: 4000251	***905 WEST NORTH TEMPL***	***NNW 1/8 - 1/4 (0.174 mi.)***	***I59***	***77***
M. KENT FOOTE Date Closed: 03/27/1991 Facility ID: 4001483	***935 W NORTH TEMPLE***	***NW 1/8 - 1/4 (0.206 mi.)***	***K68***	***80***
MINIT-LUBE #1020 Date Closed: 05/05/1995 Date Closed: 02/16/1994 Facility ID: 4000304 Facility ID: 4000575	***757 W NORTH TEMPLE***	***NE 1/8 - 1/4 (0.217 mi.)***	***N72***	***82***
7-ELEVEN 1851-24573 Date Closed: 12/18/1990 Date Closed: 03/26/2012 Facility ID: 4001026	***960 W NORTH TEMPLE***	***NW 1/8 - 1/4 (0.227 mi.)***	***M77***	***88***
FRESH MARKET 2383 Date Closed: 03/17/1997 Date Closed: 08/30/2006 Facility ID: 4000211	***140 NORTH 900 WEST***	***NNW 1/8 - 1/4 (0.231 mi.)***	***O78***	***88***
OLD GAS STATION Date Closed: 07/28/2003 Facility ID: 4002113	***180 S 1000 W***	***SW 1/4 - 1/2 (0.292 mi.)***	***83***	***93***

Lower Elevation	Address	Direction / Distance	Map ID	Page
S.L. NORTH SERVICE S	***1070 W 100 S***	***WSW 1/4 - 1/2 (0.307 mi.)***	***P84***	***93***
Date Closed: 04/18/1994				
Facility ID: 4000627				
GRANITE MILL IND. CO	***1055 W NORTH TEMPLE***	***WNW 1/4 - 1/2 (0.318 mi.)***	***86***	***94***
Date Closed: 06/19/1995				
Facility ID: 4001638				
EIMCO PROCESS EQUIPM	***669 W 200 S***	***SE 1/4 - 1/2 (0.357 mi.)***	***88***	***95***
Date Closed: 07/03/1995				
Date Closed: 05/11/1995				
Facility ID: 4001428				
QUESTAR REGULATED SE	***1175 W 130 S***	***WSW 1/4 - 1/2 (0.411 mi.)***	***95***	***106***
Date Closed: 09/28/2011				
Date Closed: 07/06/2005				
Facility ID: 4000625				
MARK STEEL	***751 W 300 S***	***SSE 1/4 - 1/2 (0.440 mi.)***	***T97***	***107***
Date Closed: 04/26/1995				
Facility ID: 4001878				
GENEVA ROCK PRODUCTS	***748 W 300 S***	***SSE 1/4 - 1/2 (0.441 mi.)***	***T98***	***108***
Date Closed: 12/11/1997				
Date Closed: 05/19/2003				
Facility ID: 4000412				
NOYCE TRANSFER CO	***736 W 300 S***	***SSE 1/4 - 1/2 (0.442 mi.)***	***T99***	***109***
Date Closed: 06/05/1995				
Facility ID: 4000661				
S.L.C. FIRE DEPT. ST	***273 N 1000 W***	***NNW 1/4 - 1/2 (0.469 mi.)***	***102***	***117***
Date Closed: 12/27/1995				
Facility ID: 4000856				

UT LAST: The Leaking Aboveground Storage Tanks database

A review of the UT LAST list, as provided by EDR, and dated 03/11/2015 has revealed that there is 1 UT LAST site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FORMER RANCHO LANES	641 WEST NORTH TEMPL	ENE 1/4 - 1/2 (0.375 mi.)	Q90	97
Date Closed: 4/10/2002				
Facility ID: 4002292				

State and tribal registered storage tank lists

UT UST: The Underground Storage Tank database contains a listing of Facility, Owner, Location & Tanks not Closed or Removed. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Quality's Facilities with at Least One Non-exempt Tank.

A review of the UT UST list, as provided by EDR, and dated 01/20/2015 has revealed that there are 15

UT UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FAMILY DOLLAR Facility ID: 4002469	***50 N 900 W***	***SW 0 - 1/8 (0.052 mi.)***	***B16***	***55***
CALDER BROS. CO, INC Facility ID: 4000119	***79 S 900 W***	***SSW 0 - 1/8 (0.079 mi.)***	***D20***	***58***
BULLOUGH INSULATION Facility ID: 4001968	***50 S 800 W***	***ESE 0 - 1/8 (0.084 mi.)***	***F23***	***59***
JEREMY STREET LLC Facility ID: 4001850	***123 S JEREMY ST (84***	***S 1/8 - 1/4 (0.129 mi.)***	***42***	***66***
CITY CAB CO. Facility ID: 4001593	***710 W 100 S***	***SE 1/8 - 1/4 (0.149 mi.)***	***H50***	***69***

Lower Elevation	Address	Direction / Distance	Map ID	Page
CREED LABORATORIES Facility ID: 4001520	***15 JERMEY STREET***	***NE 0 - 1/8 (0.013 mi.)***	***A7***	***46***
SPRINT P.O.P. Facility ID: 4002172	***840 W SOUTH TEMPLE***	***NNE 0 - 1/8 (0.025 mi.)***	***11***	***53***
DAVID EARLY #5 Facility ID: 4001899	***875 W NORTH TEMPLE***	***N 1/8 - 1/4 (0.164 mi.)***	***I52***	***69***
CARTOW Facility ID: 4000179	***738 W SOUTH TEMPLE***	***ENE 1/8 - 1/4 (0.170 mi.)***	***J57***	***75***
SMITH'S GAS & VIDEO Facility ID: 4000251	***905 WEST NORTH TEMPL***	***NNW 1/8 - 1/4 (0.174 mi.)***	***I59***	***77***
M. KENT FOOTE Facility ID: 4001483	***935 W NORTH TEMPLE***	***NW 1/8 - 1/4 (0.206 mi.)***	***K68***	***80***
MINIT-LUBE #1020 Facility ID: 4000304 Facility ID: 4000575	***757 W NORTH TEMPLE***	***NE 1/8 - 1/4 (0.217 mi.)***	***N72***	***82***
7-ELEVEN 1851-24573 Facility ID: 4001026	***960 W NORTH TEMPLE***	***NW 1/8 - 1/4 (0.227 mi.)***	***M77***	***88***
FRESH MARKET 2383 Facility ID: 4000211	***140 NORTH 900 WEST***	***NNW 1/8 - 1/4 (0.231 mi.)***	***O78***	***88***
VIA WEST Facility ID: 4002142	***118 S 1000 W***	***SW 1/8 - 1/4 (0.233 mi.)***	***79***	***89***

State and tribal institutional control / engineering control registries

Sites included on the Brownfields Sites listing that have institutional controls in place.

A review of the UT INST CONTROL list, as provided by EDR, and dated 02/02/2015 has revealed that there is 1 UT INST CONTROL site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
UTAH POWER AND LIGHT Doc #: DERR-2011-008409 Facility Id: UTD980667240	600 W SOUTH TEMPLE	E 1/4 - 1/2 (0.379 mi.)	R91	97

State and tribal voluntary cleanup sites

UT VCP: Sites involved in the Voluntary Cleanup Program.

A review of the UT VCP list, as provided by EDR, and dated 02/20/2015 has revealed that there is 1 UT VCP site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SALT LAKE CITY INTER VCP Number: VCP-C016	600 WEST 200 SOUTH	ESE 1/4 - 1/2 (0.445 mi.)	S100	109

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 12/09/2014 has revealed that there are 7 RCRA NonGen / NLR sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TABCO	940 WEST 100 SOUTH	SW 1/8 - 1/4 (0.138 mi.)	47	67

Lower Elevation	Address	Direction / Distance	Map ID	Page
CREED LABORATORIES &	15 JEREMY	NE 0 - 1/8 (0.013 mi.)	A8	51
DAVID EARLY TIRE	***875 WEST NORTH TEMPL***	***N 1/8 - 1/4 (0.164 mi.)***	***I53***	***70***
CHEVRON USA 72184 RO	***880 WEST NORTH TEMPL***	***N 1/8 - 1/4 (0.167 mi.)***	***I55***	***73***
CLEARWATER TRUCKING	738 W S TEMPLE	ENE 1/8 - 1/4 (0.170 mi.)	J58	76
MINIT-LUBE #1020	***757 WEST NORTH TEMPL***	***NE 1/8 - 1/4 (0.217 mi.)***	***N73***	***82***
RED HANGER INC # 12	***955 WEST NORTH TEMPL***	***NW 1/8 - 1/4 (0.223 mi.)***	***M75***	***85***

CONSENT: Major Legal settlements that establish responsibility and standards for cleanup at NPL (superfund) sites. Released periodically by U.S. District Courts after settlement by parties to litigation matters.

A review of the CONSENT list, as provided by EDR, and dated 01/23/2015 has revealed that there is 1 CONSENT site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
UTAH POWER & LIGHT/A	***600 W SOUTH TEMPLE***	***E 1/4 - 1/2 (0.391 mi.)***	***0***	***23***

ROD: Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid the cleanup.

A review of the ROD list, as provided by EDR, and dated 11/25/2013 has revealed that there is 1 ROD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
UTAH POWER & LIGHT/A	***600 W SOUTH TEMPLE***	***E 1/4 - 1/2 (0.391 mi.)***	***0***	***23***

UT DRYCLEANERS: A listing of registered drycleaners.

A review of the UT DRYCLEANERS list, as provided by EDR, and dated 01/20/2015 has revealed that there are 2 UT DRYCLEANERS sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
VOGUE CLEANING & SHI Facility ID: UT0801054	906 WEST 2ND SOUTH	SSW 1/8 - 1/4 (0.250 mi.)	81	92

Lower Elevation	Address	Direction / Distance	Map ID	Page
CENTURY LAUNDRY Facility ID: UT0801106	910 WEST NORTH TEMPL	NNW 1/8 - 1/4 (0.180 mi.)	K65	79

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

A review of the EDR MGP list, as provided by EDR, has revealed that there are 2 EDR MGP sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
UTAH POWER AND LIGHT	600 W SOUTH TEMPLE	E 1/4 - 1/2 (0.379 mi.)	R92	98

Lower Elevation	Address	Direction / Distance	Map ID	Page
MOUNTAIN FUELS SUPPL	1078 W 100 SOUTH	WSW 1/4 - 1/2 (0.320 mi.)	P87	95

EXECUTIVE SUMMARY

EDR US Hist Auto Stat: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR US Hist Auto Stat list, as provided by EDR, has revealed that there are 32 EDR US Hist Auto Stat sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	51 JEREMY ST	SSE 0 - 1/8 (0.034 mi.)	12	53
Not reported	35 S 900 W	WSW 0 - 1/8 (0.042 mi.)	B13	54
Not reported	79 S 900 W	SSW 0 - 1/8 (0.079 mi.)	D19	57
SUGDEN W L AUTO REPR	47 S 8TH WEST ST	ESE 0 - 1/8 (0.104 mi.)	F32	61
BRUCE HUSKEY	79 S 8TH WEST ST	SE 0 - 1/8 (0.110 mi.)	F33	62
HICKEYS PHILLIPS 66	776 E 1ST S	SE 1/8 - 1/4 (0.129 mi.)	F40	65
TEXAS CO SER STA	776 E 1ST SOUTH ST	SE 1/8 - 1/4 (0.129 mi.)	F41	65
EAST SIDE GARAGE	774 E 1ST S	SE 1/8 - 1/4 (0.132 mi.)	F43	66
PETERSEN REED B FILL	774 E 1ST SOUTH ST	SE 1/8 - 1/4 (0.132 mi.)	F44	66
NENOW HERB SERV STA	180 S 8TH W	SSE 1/8 - 1/4 (0.175 mi.)	L61	78
CLIFFS AMERICAN OIL	180 S 8TH WEST ST	SSE 1/8 - 1/4 (0.175 mi.)	L62	78

Lower Elevation	Address	Direction / Distance	Map ID	Page
SERVICE SALES CO WHO	15 S 9TH WEST ST	WNW 0 - 1/8 (0.023 mi.)	A10	53
TONYS AUTOMOTIVE GEN	872 SOUTH TEMPLE ST	NNW 0 - 1/8 (0.047 mi.)	C14	54
Not reported	1 N 900 W	NW 0 - 1/8 (0.052 mi.)	C15	55
Not reported	15 N 900 W	NW 0 - 1/8 (0.071 mi.)	C17	56
Not reported	867 EMERIL AVE	N 0 - 1/8 (0.072 mi.)	C18	56
FLASH GORDON TRANSMI	1 N 8TH WEST ST	ENE 0 - 1/8 (0.080 mi.)	E21	58
Not reported	920 W SOUTH TEMPLE	WNW 0 - 1/8 (0.082 mi.)	22	58
MADSEN BOYD GARAGE A	10 N 8TH WEST ST	ENE 0 - 1/8 (0.099 mi.)	E31	61
SMETHURST LEONARD S	947 FOLSOM AVE	WSW 0 - 1/8 (0.114 mi.)	G34	62
Not reported	955 FOLSOM AVE	WSW 1/8 - 1/4 (0.126 mi.)	G39	65
WILFS CONOCO SERV GA	875 N TEMPLE WEST	N 1/8 - 1/4 (0.138 mi.)	I46	67
OPOULOS AUTOMOTIVE &	741 SOUTH TEMPLE ST	E 1/8 - 1/4 (0.148 mi.)	J49	68
Not reported	741 W SOUTH TEMPLE	ENE 1/8 - 1/4 (0.151 mi.)	J51	69
Not reported	875 W NORTH TEMPLE	N 1/8 - 1/4 (0.164 mi.)	I54	72
CHIPMAN FILLING STA	905 N TEMPLE WEST	NNW 1/8 - 1/4 (0.169 mi.)	K56	75
Not reported	905 W NORTH TEMPLE	NNW 1/8 - 1/4 (0.174 mi.)	I60	77
NENOWS HERB SERVICE	935 N TEMPLE WEST	NW 1/8 - 1/4 (0.182 mi.)	K66	79
Not reported	25 S 1000 W	W 1/8 - 1/4 (0.188 mi.)	67	80
STAR SERVICE PETROLE	955 N TEMPLE WEST	NW 1/8 - 1/4 (0.207 mi.)	M69	81
QUALITY OIL CO SER S	980 NORTH TEMPLE ST	NNW 1/8 - 1/4 (0.213 mi.)	K70	81
Not reported	757 W NORTH TEMPLE	NE 1/8 - 1/4 (0.217 mi.)	N74	84

EXECUTIVE SUMMARY

EDR US Hist Cleaners: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR US Hist Cleaners list, as provided by EDR, has revealed that there are 17 EDR US Hist Cleaners sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
LAUNDRY EQUIPMENT PA	42 JEREMY ST	SSE 0 - 1/8 (0.022 mi.)	A9	52
MELS LAUNDROMAT	56 S 8TH WEST ST	SE 0 - 1/8 (0.087 mi.)	F24	60
EXCELLENT CLNS	880 W 1ST N	SSW 0 - 1/8 (0.090 mi.)	D25	60
EXCELLENT CLEANEIS	880 W 1ST NORTH ST	SSW 0 - 1/8 (0.090 mi.)	D26	60
VOGUE COMMERCIAL & I	906 S 1ST WEST ST	SSW 0 - 1/8 (0.099 mi.)	D27	60
VOGUE CLQ & SHIRT LN	906 S 1ST W	SSW 0 - 1/8 (0.099 mi.)	D28	61
CHICAGO CLNG CO	902 S 1ST W	SSW 0 - 1/8 (0.099 mi.)	D29	61
PARAMOUNT CLNRS & DY	902 S 1ST WEST ST	SSW 0 - 1/8 (0.099 mi.)	D30	61
ALLEN CLEANERS	909 S 1ST W	SSW 0 - 1/8 (0.115 mi.)	D35	63
HANSEN HOME CLEANING	911 S 1ST W	SSW 0 - 1/8 (0.115 mi.)	D36	63
ALOHA CLEANERS	802 W 1ST SOUTH ST	SE 0 - 1/8 (0.116 mi.)	H37	63
MARSHON LAUNDRY SUPP	132 S 800 WEST ST	SSE 1/8 - 1/4 (0.134 mi.)	H45	67
STAR LAUNDRY	151 W 9TH SOUTH ST	S 1/8 - 1/4 (0.178 mi.)	63	78

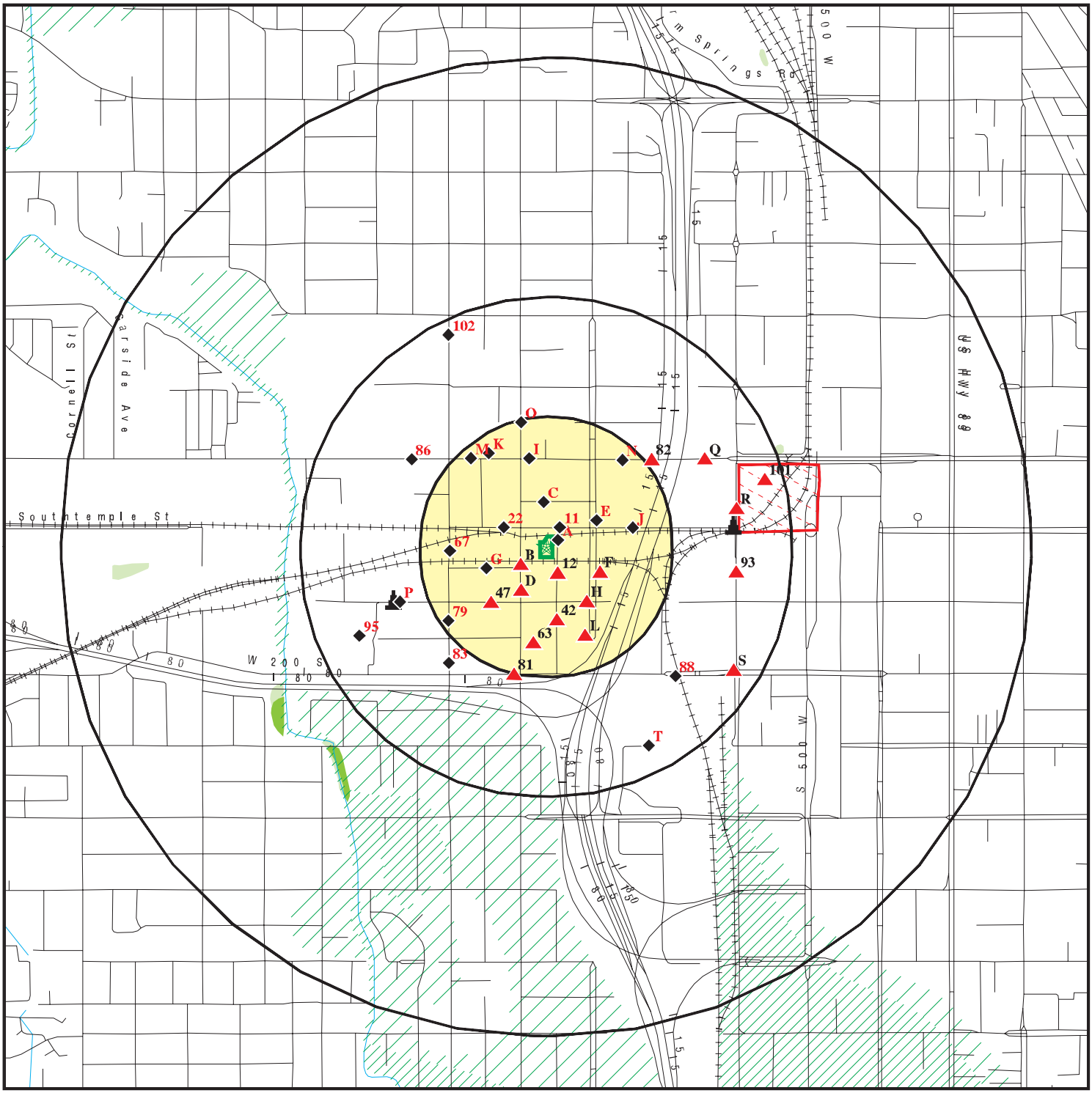
Lower Elevation	Address	Direction / Distance	Map ID	Page
SANITARY CLEANERS	71 N 9TH W	NNW 1/8 - 1/4 (0.139 mi.)	I48	68
Not reported	910 W NORTH TEMPLE	NNW 1/8 - 1/4 (0.180 mi.)	K64	78
BROWN LEE CLEANERS	963 N TEMPLE WEST	NW 1/8 - 1/4 (0.215 mi.)	M71	81
Not reported	955 W NORTH TEMPLE	NW 1/8 - 1/4 (0.223 mi.)	M76	87

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 6 records.

Site Name	Database(s)
BP PRODUCTS NO. AMERICA INC. SLC,	RCRA-TSDF, CERC-NFRAP, CORRACTS, RCRA NonGen / NLR, FINDS, US FIN ASSUR, 2020 COR ACTION
JENNINGS AND PASCOE SMELTER	CERC-NFRAP, LEAD SMELTERS
OLD SALT LAKE CITY FIRE STATION	CERC-NFRAP
BULLOUGH ASBESTOS	CERC-NFRAP
AMOCO REFINERY LEADED SLUDGE STORA	CERC-NFRAP
STANDARD SMELTING AND REFINING COM	CERC-NFRAP

OVERVIEW MAP - 4281472.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

0 1/4 1/2 1 Miles

Indian Reservations BIA

Oil & Gas pipelines from USGS

100-year flood zone

500-year flood zone

National Wetland Inventory

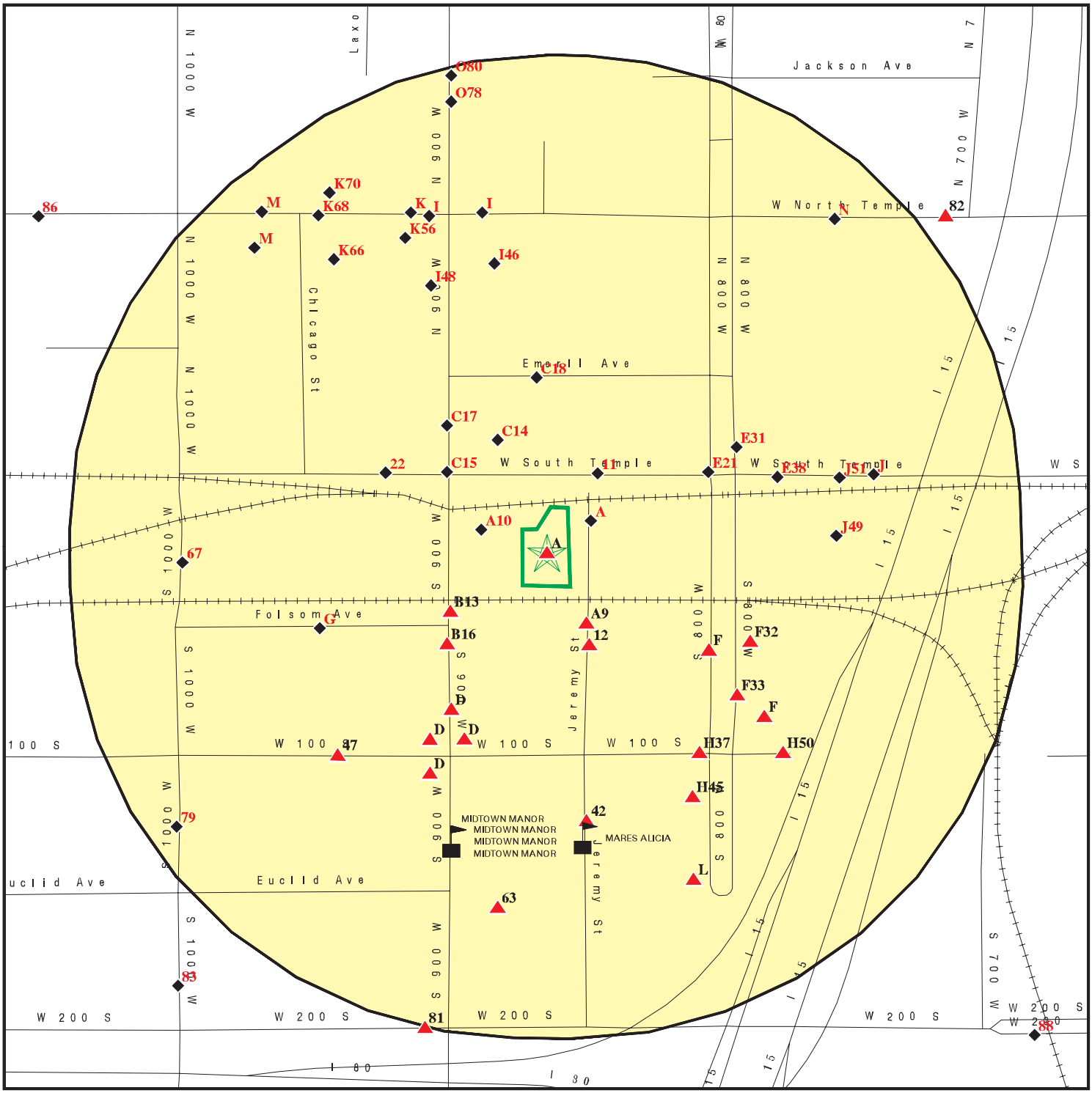
State Wetlands

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Crown Plating and Schovaers Electronics	CLIENT:	Terracon, Inc.
ADDRESS:	8, 14, and 22 South Jeremy Street Salt Lake City UT 84104	CONTACT:	Ashley Scothern
LAT/LONG:	40.7688 / 111.9158	INQUIRY #:	4281472.2s
		DATE:	May 01, 2015 5:48 pm

DETAIL MAP - 4281472.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

Indian Reservations BIA

Oil & Gas pipelines from USGS

100-year flood zone

500-year flood zone

0 1/16 1/8 1/4 Miles

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Crown Plating and Schovaers Electronics	CLIENT: Terracon, Inc.
ADDRESS: 8, 14, and 22 South Jeremy Street Salt Lake City UT 84104	CONTACT: Ashley Scothern INQUIRY #: 4281472.2s
LAT/LONG: 40.7688 / 111.9158	DATE: May 01, 2015 5:49 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	1	0	NR	1
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS	0.500		0	0	1	NR	NR	1
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP	0.500		0	0	2	NR	NR	2
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	2	0	NR	2
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250	2	0	1	NR	NR	NR	3
RCRA-CESQG	0.250		1	0	NR	NR	NR	1
Federal institutional controls / engineering controls registries								
US ENG CONTROLS	0.500		0	0	1	NR	NR	1
US INST CONTROL	0.500		0	0	1	NR	NR	1
LUCIS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent CERCLIS								
UT SHWS	N/A		N/A	N/A	N/A	N/A	N/A	N/A
State and tribal landfill and/or solid waste disposal site lists								
UT SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
UT LUST	0.500		3	9	12	NR	NR	24
UT LAST	0.500		0	0	1	NR	NR	1
INDIAN LUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
UT UST	0.250		5	10	NR	NR	NR	15

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
UT AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
FEMA UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
UT INST CONTROL	0.500		0	0	1	NR	NR	1
State and tribal voluntary cleanup sites								
UT VCP	0.500		0	0	1	NR	NR	1
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
UT BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL	TP		NR	NR	NR	NR	NR	0
UT CDL	TP		NR	NR	NR	NR	NR	0
US HIST CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
UT SPILLS	TP		NR	NR	NR	NR	NR	0
UT SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		1	6	NR	NR	NR	7
DOT OPS	TP		NR	NR	NR	NR	NR	0
DOD	1.000		0	0	0	0	NR	0
FUDS	1.000		0	0	0	0	NR	0
CONSENT	1.000		0	0	1	0	NR	1
ROD	1.000		0	0	1	0	NR	1
UMTRA	0.500		0	0	0	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
TSCA	TP		NR	NR	NR	NR	NR	0
FTTS	TP	1	NR	NR	NR	NR	NR	1
HIST FTTS	TP	1	NR	NR	NR	NR	NR	1
SSTS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
FINDS	TP	2	NR	NR	NR	NR	NR	2
RAATS	TP		NR	NR	NR	NR	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
UT UIC	TP		NR	NR	NR	NR	NR	0
UT DRYCLEANERS	0.250		0	2	NR	NR	NR	2
CA HAZNET	TP	1	NR	NR	NR	NR	NR	1
UT NPDES	TP	1	NR	NR	NR	NR	NR	1
UT TIER 2	TP		NR	NR	NR	NR	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
UT FUDS	TP		NR	NR	NR	NR	NR	0
UT Financial Assurance	TP		NR	NR	NR	NR	NR	0
UT UOPF	TP		NR	NR	NR	NR	NR	0
UT EWA	TP		NR	NR	NR	NR	NR	0
UT MMRP	TP		NR	NR	NR	NR	NR	0
US AIRS	TP	1	NR	NR	NR	NR	NR	1
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	2	0	NR	2
EDR US Hist Auto Stat	0.250		14	18	NR	NR	NR	32
EDR US Hist Cleaners	0.250		11	6	NR	NR	NR	17
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
UT RGA LUST	TP		NR	NR	NR	NR	NR	0
UT RGA LF	TP		NR	NR	NR	NR	NR	0
- Totals --		9	35	52	29	0	0	123

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

N/A = This State does not maintain a SHWS list. See the Federal CERCLIS list.

A1 **SCHOVAERS ELECTRONICS CORP** **CA HAZNET** **S113185717**
Target **22 JEREMY** **N/A**
Property **SALT LAKE CITY, UT 84104**

Site 1 of 10 in cluster A

Actual:
4233 ft.

HAZNET:

envid:	S113185717
Year:	2000
GEPAID:	UTD085325769
Contact:	STOCKHOLDERS
Telephone:	8015212668
Mailing Name:	Not reported
Mailing Address:	22 JEREMY ST
Mailing City,St,Zip:	SALT LAKE CITY, UT 841041131
Gen County:	Not reported
TSD EPA ID:	CAT080033691
TSD County:	Not reported
Waste Category:	Liquids with pH <= 2 with metals
Disposal Method:	Disposal, Land Fill
Tons:	0.75
Facility County:	99

envid:	S113185717
Year:	2000
GEPAID:	UTD085325769
Contact:	STOCKHOLDERS
Telephone:	8015212668
Mailing Name:	Not reported
Mailing Address:	22 JEREMY ST
Mailing City,St,Zip:	SALT LAKE CITY, UT 841041131
Gen County:	Not reported
TSD EPA ID:	CAT080033681
TSD County:	Not reported
Waste Category:	Liquids with pH <= 2 with metals
Disposal Method:	Disposal, Land Fill
Tons:	1
Facility County:	99

envid:	S113185717
Year:	1999
GEPAID:	UTD085325769
Contact:	STOCKHOLDERS
Telephone:	8015212668
Mailing Name:	Not reported
Mailing Address:	22 JEREMY ST
Mailing City,St,Zip:	SALT LAKE CITY, UT 841041131
Gen County:	Not reported
TSD EPA ID:	CAT080033681
TSD County:	Not reported
Waste Category:	Liquids with pH <= 2 with metals
Disposal Method:	Disposal, Land Fill
Tons:	.7500
Facility County:	99

envid:	S113185717
Year:	1999
GEPAID:	UTD085325769
Contact:	STOCKHOLDERS

SCHOVAERS ELECTRONICS CORP (Continued) **S113185717**

Telephone:	8015212668
Mailing Name:	Not reported
Mailing Address:	22 JEREMY ST
Mailing City,St,Zip:	SALT LAKE CITY, UT 841041131
Gen County:	Not reported
TSD EPA ID:	CAT080033691
TSD County:	Not reported
Waste Category:	Liquids with pH <= 2 with metals
Disposal Method:	Disposal, Land Fill
Tons:	1.0000
Facility County:	99
envid:	S113185717
Year:	1998
GEPAID:	UTD085325769
Contact:	STOCKHOLDERS
Telephone:	8015212668
Mailing Name:	Not reported
Mailing Address:	22 JEREMY ST
Mailing City,St,Zip:	SALT LAKE CITY, UT 841041131
Gen County:	Not reported
TSD EPA ID:	CAT080033681
TSD County:	Not reported
Waste Category:	Not reported
Disposal Method:	Disposal, Other
Tons:	.9000
Facility County:	99

Click this hyperlink while viewing on your computer to access
19 additional CA_HAZNET: record(s) in the EDR Site Report.

A2 **CROWN PLATING CO. INC.** **RCRA-SQG 1000437674**
Target **14 JEREMY STREET** **FINDS UTD009086372**
Property **SALT LAKE CITY, UT 84104** **US AIRS**

Site 2 of 10 in cluster A

Actual: 4233 ft.

RCRA-SQG:

Date form received by agency:	06/11/2013
Facility name:	CROWN PLATING CO. INC.
Facility address:	14 JEREMY STREET SALT LAKE CITY, UT 84104
EPA ID:	UTD009086372
Contact:	JOSEPH L BROSCHINSKY
Contact address:	Not reported Not reported
Contact country:	US
Contact telephone:	(801) 364-0201
Contact email:	JOSEPHB@BURGOYNE.COM
EPA Region:	08
Land type:	Private
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

CROWN PLATING CO. INC. (Continued) **1000437674**

Owner/Operator Summary:
Owner/operator name: JOSEPH BROSCHINSKY
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/02/1981
Owner/Op end date: Not reported

Owner/operator name: CHARLES E & CLYED BROSCHINSKY
Owner/operator address: DATA NOT REQUESTED
DATA NOT REQUESTED, UT 99999
Owner/operator country: Not reported
Owner/operator telephone: (999) 999-9999
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: JOSEPH L. BROSCHINSKY
Owner/operator address: 14 JEREMY STREET
SALT LAKE CITY, UT 84104
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 05/01/1984
Owner/Op end date: Not reported

Owner/operator name: JOSEPH BROSCHINSKY
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Not reported
Owner/Operator Type: Owner
Owner/Op start date: 01/01/1981
Owner/Op end date: Not reported

Owner/operator name: JOSEPH BROSCHINSKY
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/01/1981
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No

CROWN PLATING CO. INC. (Continued) **1000437674**

Treater, storer or disposer of HW: Yes
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: F006
. Waste name: WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS, EXCEPT FROM THE FOLLOWING PROCESSES: (1) SULFURIC ACID ANODIZING OF ALUMINUM; (2) TIN PLATING ON CARBON STEEL; (3) ZINC PLATING (SEGREGATED BASIS) ON CARBON STEEL; (4) ALUMINUM OR ZINC-ALUMINUM PLATING ON CARBON STEEL; (5) CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC, AND ALUMINUM PLATING ON CARBON STEEL; AND (6) CHEMICAL ETCHING AND MILLING OF ALUMINUM.

. Waste code: F999
. Waste name: Residues from demilitarization, treatment, and testing of nerve, military, and chemical agents CX, GA, GB, GD, H, HD, HL, HN-1, HN-2, HN-3, HT, L, T, and VX.

Historical Generators:
Date form received by agency: 03/02/2006
Site name: CROWN PLATING CO. INC.
Classification: Small Quantity Generator

. Waste code: F006
. Waste name: WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS, EXCEPT FROM THE FOLLOWING PROCESSES: (1) SULFURIC ACID ANODIZING OF ALUMINUM; (2) TIN PLATING ON CARBON STEEL; (3) ZINC PLATING (SEGREGATED BASIS) ON CARBON STEEL; (4) ALUMINUM OR ZINC-ALUMINUM PLATING ON CARBON STEEL; (5) CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC, AND ALUMINUM PLATING ON CARBON STEEL; AND (6) CHEMICAL ETCHING AND MILLING OF ALUMINUM.

. Waste code: F999
. Waste name: Residues from demilitarization, treatment, and testing of nerve, military, and chemical agents CX, GA, GB, GD, H, HD, HL, HN-1, HN-2, HN-3, HT, L, T, and VX.

Date form received by agency: 03/03/2004
Site name: CROWN PLATING CO. INC.
Classification: Large Quantity Generator

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: F006
. Waste name: WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS, EXCEPT

CROWN PLATING CO. INC. (Continued) **1000437674**

FROM THE FOLLOWING PROCESSES: (1) SULFURIC ACID ANODIZING OF ALUMINUM; (2) TIN PLATING ON CARBON STEEL; (3) ZINC PLATING (SEGREGATED BASIS) ON CARBON STEEL; (4) ALUMINUM OR ZINC-ALUMINUM PLATING ON CARBON STEEL; (5) CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC, AND ALUMINUM PLATING ON CARBON STEEL; AND (6) CHEMICAL ETCHING AND MILLING OF ALUMINUM.

Date form received by agency: 05/13/2002
Site name: CROWN PLATING CO. INC.
Classification: Large Quantity Generator

. Waste code: D006
. Waste name: CADMIUM

Date form received by agency: 10/20/1980
Site name: CROWN PLATING COMPANY
Classification: Large Quantity Generator

. Waste code: F006
. Waste name: WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS, EXCEPT FROM THE FOLLOWING PROCESSES: (1) SULFURIC ACID ANODIZING OF ALUMINUM; (2) TIN PLATING ON CARBON STEEL; (3) ZINC PLATING (SEGREGATED BASIS) ON CARBON STEEL; (4) ALUMINUM OR ZINC-ALUMINUM PLATING ON CARBON STEEL; (5) CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC, AND ALUMINUM PLATING ON CARBON STEEL; AND (6) CHEMICAL ETCHING AND MILLING OF ALUMINUM.

. Waste code: F008
. Waste name: PLATING BATH RESIDUES FROM THE BOTTOM OF PLATING BATHS FROM ELECTROPLATING OPERATIONS IN WHICH CYANIDES ARE USED IN THE PROCESS.

. Waste code: F009
. Waste name: SPENT STRIPPING AND CLEANING BATH SOLUTIONS FROM ELECTROPLATING OPERATIONS IN WHICH CYANIDES ARE USED IN THE PROCESS.

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: TSD IS-Container Use and Management
Date violation determined: 03/08/2007
Date achieved compliance: 03/20/2007
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 06/21/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD IS-Preparedness and Prevention
Date violation determined: 03/08/2007
Date achieved compliance: 03/20/2007
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 06/21/2007

CROWN PLATING CO. INC. (Continued) **1000437674**

Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 06/11/1990
Date achieved compliance: 09/11/2001
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: LDR - General
Date violation determined: 06/11/1990
Date achieved compliance: 09/11/2001
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 02/17/1988
Date achieved compliance: 09/11/2001
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 02/17/1988
Date achieved compliance: 02/29/1988
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/29/1988
Enf. disposition status: Not reported

CROWN PLATING CO. INC. (Continued) **1000437674**

Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 03/12/1986
Date achieved compliance: 04/25/1986
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/17/1986
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 11/18/2013
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/08/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Container Use and Management
Date achieved compliance: 03/20/2007
Evaluation lead agency: State

Evaluation date: 03/08/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Preparedness and Prevention
Date achieved compliance: 03/20/2007
Evaluation lead agency: State

Evaluation date: 09/11/2001
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/11/1990
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: LDR - General
Date achieved compliance: 09/11/2001
Evaluation lead agency: EPA

Evaluation date: 06/11/1990
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 09/11/2001
Evaluation lead agency: EPA

CROWN PLATING CO. INC. (Continued) **1000437674**

Evaluation date: 02/17/1988
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 02/29/1988
Evaluation lead agency: State

Evaluation date: 02/17/1988
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 09/11/2001
Evaluation lead agency: EPA

Evaluation date: 02/17/1988
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA-Initiated Oversight/Observation/Training Actions

Evaluation date: 03/12/1986
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Generators - General
Date achieved compliance: 04/25/1986
Evaluation lead agency: State

Evaluation date: 06/05/1985
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

FINDS:

Registry ID: 110002159789

Environmental Interest/Information System

AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain

CROWN PLATING CO. INC. (Continued) **1000437674**

limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

The CIM (Utah - Common Identifier Mechanism) is Utah's Department of Environmental Quality (UDEQ) mechanism for compliance and permitting operations.

HAZARDOUS WASTE BIENNIAL REPORTER

CRITERIA AND HAZARDOUS AIR POLLUTANT INVENTORY

ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

AIRS (AFS):

Airs Minor Details:

EPA plant ID:	110002159789
Plant name:	CROWN PLATING COMPANY
Plant address:	14 JEREMY STREET SALT LAKE CITY, UT 84104
County:	SALT LAKE
Region code:	08
Dunn & Bradst #:	Not reported
Air quality cntrl region:	220
Sic code:	3471
Sic code desc:	PLATING AND POLISHING
North Am. industrial classf:	332813
NAIC code description:	Electroplating, Plating, Polishing, Anodizing, and Coloring
Default compliance status:	IN COMPLIANCE - INSPECTION
Default classification:	POTENTIAL UNCONTROLLED EMISSIONS < 100 TONS/YEAR
Govt facility:	ALL OTHER FACILITIES NOT OWNED OR OPERATED BY A FEDERAL, STATE, OR LOCAL GOVERNMENT
Current HPV:	Not reported

CROWN PLATING CO. INC. (Continued) **1000437674**

Compliance and Enforcement Major Issues:
Air program: SIP SOURCE
National action type: Not reported
Date achieved: 00000
Penalty amount: Not reported

Air program: Not reported
National action type: Not reported
Date achieved: Not reported
Penalty amount: Not reported

Air program: Not reported
National action type: Not reported
Date achieved: Not reported
Penalty amount: Not reported

Historical Compliance Minor Sources:
State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1402
Air prog code hist file: MACT (SECTION 63 NESHAPS)

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1401
Air prog code hist file: MACT (SECTION 63 NESHAPS)

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1303
Air prog code hist file: MACT (SECTION 63 NESHAPS)

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1301
Air prog code hist file: MACT (SECTION 63 NESHAPS)

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1204
Air prog code hist file: MACT (SECTION 63 NESHAPS)

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1202
Air prog code hist file: MACT (SECTION 63 NESHAPS)

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1104
Air prog code hist file: MACT (SECTION 63 NESHAPS)

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1403
Air prog code hist file: MACT (SECTION 63 NESHAPS)

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1304
Air prog code hist file: MACT (SECTION 63 NESHAPS)

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1302
Air prog code hist file: MACT (SECTION 63 NESHAPS)

CROWN PLATING CO. INC. (Continued) **1000437674**

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1203
Air prog code hist file: MACT (SECTION 63 NESHAPS)

State compliance status: NO APPLICABLE STATE REGULATION
Hist compliance date: 1201
Air prog code hist file: MACT (SECTION 63 NESHAPS)

Compliance & Violation Data by Minor Sources:
Air program code: MACT (SECTION 63 NESHAPS)
Plant air program pollutant: Not reported
Default pollutant classification: POTENTIAL UNCONTROLLED EMISSIONS < 100 TONS/YEAR
Def. poll. compliance status: IN COMPLIANCE - INSPECTION
Def. attainment/non attnmnt: ATTAINMENT AREA FOR GIVEN POLLUTANT
Repeat violator date: Not reported
Turnover compliance: Not reported

A3 **SCHOVAERS ELECTRONICS CORP.** **RCRA-SQG** **1000343583**
Target **22 JEREMY STREET** **UTD085325769**
Property **SALT LAKE CITY, UT 84104**

Site 3 of 10 in cluster A

Actual: 4233 ft.

RCRA-SQG:
Date form received by agency: 02/16/1994
Facility name: SCHOVAERS ELECTRONICS CORP.
Site name: SCHOVAERS ELECTRONICS
Facility address: 22 JEREMY STREET
SALT LAKE CITY, UT 841040000
EPA ID: UTD085325769
Contact: BOB SCHOVAERS
Contact address: Not reported
Not reported
Contact country: US
Contact telephone: (801) 521-2668
Contact email: Not reported
EPA Region: 08
Land type: Facility is not located on Indian land. Additional information is not known.
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No

SCHOVAERS ELECTRONICS CORP. (Continued) **1000343583**

Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 03/31/1992
Site name: SCHOVAERS ELECTRONICS CORP.
Classification: Large Quantity Generator

Date form received by agency: 03/03/1990
Site name: SCHOVAERS ELECTRONICS CORP.
Classification: Large Quantity Generator

Date form received by agency: 03/24/1986
Site name: SCHOVAERS ELECTRONICS CORP.
Classification: Small Quantity Generator

. Waste code: D000
. Waste name: Not Defined

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D008
. Waste name: LEAD

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 08/27/2014
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/10/2009
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

A4 **CROWN PLATING CO., INC.** **FTTS** **1008178265**
Target **14 JEREMY ST.** **HIST FTTS** **N/A**
Property **SALT LAKE CITY, UT 84104**

Site 4 of 10 in cluster A

Actual:
4233 ft.

FTTS INSP:
Inspection Number: 2004070113582 1
Region: 08
Inspection Date: 07/01/04
Inspector: MOORE, WM.
Violation occurred: No
Investigation Type: EPCRA, Enforcement, SEE Conducted
Investigation Reason: Neutral Scheme, Region
Legislation Code: EPCRA
Facility Function: Manufacturer

CROWN PLATING CO., INC. (Continued) **1008178265**

HIST FTTS INSP:
Inspection Number: 2004070113582 1
Region: 08
Inspection Date: Not reported
Inspector: MOORE, WM.
Violation occurred: No
Investigation Type: EPCRA, Enforcement, SEE Conducted
Investigation Reason: Neutral Scheme, Region
Legislation Code: EPCRA
Facility Function: Manufacturer

A5 **SCHOVAERS ELECTRONICS CORP.** **FINDS** **1005529597**
Target **22 JEREMY** **N/A**
Property **SALT LAKE CITY, UT 84104**

Site 5 of 10 in cluster A

Actual:
4233 ft.

FINDS:

Registry ID: 110010918999

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

A6 **CROWN PLATING CO, INC** **UT NPDES** **S107869206**
Target **14 JEREMY ST.** **N/A**
Property **SALT LAKE CITY, UT 84104**

Site 6 of 10 in cluster A

Actual:
4233 ft.

NPDES:
Permit: UTR000378
Facility Contact Name: JOE BROSCHINSKY
Issue Date: 01/01/2012
Expiration Date: 12/31/2015
State Water Body Name: GROUND WATER
NonConstruction Storm Water: NON CONSTRUCTION
Facility Oper Name: CROWN PLATING CO INC
Facility Oper Address: 14 JEREMY ST
Facility Oper City: SALT LAKE
Facility Oper State: UT
Facility Oper Zip: 84104
Facility Oper Phone #: 8013640201
Status Of Owner/Oper: P
Facility Oper Contact Person: JOE BROSCHINSKY
Facility Oper Contact Title: PRESIDENT
Facility Oper Contact Phone: 8013640201
Facility Site Contact Person: JOE BROSCHINSKY
Facility Site Contact Tile: PRESIDENT

CROWN PLATING CO, INC (Continued) **S107869206**

Facility Site Contact Phone:	(801)364-0201
Muni Operating Storm Sewer System:	SALT LAKE CITY CORP
Receiving Water Body:	GROUND WATER
Primary SIC Code:	3471
Group 1:	Not reported
Group 2:	Not reported
Group 3:	AA
Group 4:	Not reported
Group 5:	Not reported
Primary Sector:	AA
Secondary Sector:	Not reported
Third Sector:	Not reported
Fourth Sector:	Not reported
Certification Name:	JOSEPH BROSCHINSKY
Date Signed:	01/01/2012
Amount Paid:	$550.00
Date Noi Received:	01/01/2012
Date Noi Complete:	01/01/2012
Date Coverage Issued/Renewed:	01/01/2012
Date Coverage Effective:	01/01/2012
Date Coverage Expires:	12/31/2015
Inactivated:	Not reported
No Exposure:	Not reported
Not Received:	Not reported
Permit Type:	Not reported
Permit Name:	Not reported
DMR Cognizant Official:	Not reported
DMR Cognizant Official Tele:	Not reported
Facility Site Lat:	40 46 08 27
Facility Site Long:	111 54 55 41

Permit:	UTR000378
Facility Contact Name:	JOE BROSCHINSKY
Issue Date:	Not reported
Expiration Date:	12/31/2015
State Water Body Name:	GROUND WATER
NonConstruction Storm Water:	STORMWATER
Facility Oper Name:	CROWN PLATING CO INC
Facility Oper Address:	14 JEREMY ST
Facility Oper City:	OTHER
Facility Oper State:	UT
Facility Oper Zip:	84104
Facility Oper Phone #:	801-364-0201
Status Of Owner/Oper:	MAIN
Facility Oper Contact Person:	JOE BROSCHINSKY
Facility Oper Contact Title:	PRESIDENT
Facility Oper Contact Phone:	801-364-0201
Facility Site Contact Person:	JOE BROSCHINSKY
Facility Site Contact Tile:	PRESIDENT
Facility Site Contact Phone:	801-364-0201
Muni Operating Storm Sewer System:	SALT LAKE CITY CORP
Receiving Water Body:	GROUND WATER
Primary SIC Code:	3471
Group 1:	Not reported
Group 2:	Not reported
Group 3:	AA
Group 4:	Not reported

CROWN PLATING CO, INC (Continued) **S107869206**

Group 5:	Not reported
Primary Sector:	3471
Secondary Sector:	Not reported
Third Sector:	Not reported
Fourth Sector:	Not reported
Certification Name:	JOSEPH BROSCHINSKY
Date Signed:	07/28/2005
Amount Paid:	$41.00
Date Noi Received:	07/28/2005
Date Noi Complete:	Not reported
Date Coverage Issued/Renewed:	Not reported
Date Coverage Effective:	01/01/2012
Date Coverage Expires:	12/31/2015
Inactivated:	Not reported
No Exposure:	0
Not Received:	Not reported
Permit Type:	INDUSTRIAL
Permit Name:	Not reported
DMR Cognizant Official:	Not reported
DMR Cognizant Official Tele:	Not reported
Facility Site Lat:	40 46 08 27
Facility Site Long:	111 54 55 41

Permit:	UTR000378
Facility Contact Name:	Not reported
Issue Date:	01/01/2012
Expiration Date:	12/31/2016
State Water Body Name:	GROUND WATER
NonConstruction Storm Water:	GRAMA
Facility Oper Name:	Not reported
Facility Oper Address:	Not reported
Facility Oper City:	Not reported
Facility Oper State:	Not reported
Facility Oper Zip:	Not reported
Facility Oper Phone #:	Not reported
Status Of Owner/Oper:	Not reported
Facility Oper Contact Person:	Not reported
Facility Oper Contact Title:	Not reported
Facility Oper Contact Phone:	Not reported
Facility Site Contact Person:	Not reported
Facility Site Contact Tile:	Not reported
Facility Site Contact Phone:	Not reported
Muni Operating Storm Sewer System:	Not reported
Receiving Water Body:	GROUND WATER
Primary SIC Code:	Not reported
Group 1:	Not reported
Group 2:	Not reported
Group 3:	Not reported
Group 4:	Not reported
Group 5:	Not reported
Primary Sector:	Not reported
Secondary Sector:	Not reported
Third Sector:	Not reported
Fourth Sector:	Not reported
Certification Name:	Not reported
Date Signed:	Not reported
Amount Paid:	Not reported

CROWN PLATING CO, INC (Continued) **S107869206**

Date Noi Received:	Not reported
Date Noi Complete:	Not reported
Date Coverage Issued/Renewed:	01/01/2012
Date Coverage Effective:	01/01/2012
Date Coverage Expires:	12/31/2016
Inactivated:	Not reported
No Exposure:	Not reported
Not Received:	Not reported
Permit Type:	General Multi-Sector Permit
Permit Name:	CROWN PLATING CO. INC.
DMR Cognizant Official:	JOE BROSCHINSKY
DMR Cognizant Official Tele:	801-364-0201
Facility Site Lat:	+40.768944
Facility Site Long:	-111.915389

NPL
Region
East
1/4-1/2
2063 ft.

UTAH POWER & LIGHT/AMERICAN BARREL CO.
600 W SOUTH TEMPLE
SALT LAKE CITY, UT 84104

NPL **1000238438**
CERCLIS **UTD980667240**
US ENG CONTROLS
US INST CONTROL
CONSENT
ROD
ICIS
PRP

NPL:

EPA ID:	UTD980667240
EPA Region:	08
Federal:	N
Final Date:	1989-10-04 00:00:00

Category Details:

NPL Status:	Currently on the Final NPL
Category Description:	Depth To Aquifer-> 10 And <= 25 Feet
Category Value:	14

NPL Status:	Currently on the Final NPL
Category Description:	Distance To Nearest Population-> 0 And <= 1/4 Mile
Category Value:	225

Site Details:

Site Name:	UTAH POWER & LIGHT/AMERICAN BARREL CO.
Site Status:	Final
Site Zip:	84104
Site City:	SALT LAKE CITY
Site State:	UT
Federal Site:	No
Site County:	SALT LAKE
EPA Region:	08
Date Proposed:	05/05/89
Date Deleted:	Not reported
Date Finalized:	10/04/89

Substance Details:

NPL Status:	Currently on the Final NPL
Substance ID:	Not reported
Substance:	Not reported

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

CAS #: Not reported
Pathway: Not reported
Scoring: Not reported

NPL Status: Currently on the Final NPL
Substance ID: C113
Substance: STYRENE
CAS #: 100-42-5
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: C332
Substance: PHENANTHRENE
CAS #: 85-01-8
Pathway: NO PATHWAY INDICATED
Scoring: 1

NPL Status: Currently on the Final NPL
Substance ID: C352
Substance: ACENAPHTHYLENE
CAS #: 208-96-8
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: C385
Substance: PYRENE
CAS #: 129-00-0
Pathway: NO PATHWAY INDICATED
Scoring: 1

NPL Status: Currently on the Final NPL
Substance ID: C613
Substance: METHYL PHENOL, 4-
CAS #: 106-44-5
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: C636
Substance: METHYLNAPHTHALENE, 2-
CAS #: 91-57-6
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: C643
Substance: METHYL PHENOL, 2-
CAS #: 95-48-7
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: U019
Substance: BENZENE
CAS #: 71-43-2

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: U022
Substance: BENZO(A)PYRENE
CAS #: 50-32-8
Pathway: GROUND WATER PATHWAY
Scoring: 3

NPL Status: Currently on the Final NPL
Substance ID: U050
Substance: CHRYSENE
CAS #: 218-01-9
Pathway: NO PATHWAY INDICATED
Scoring: 1

NPL Status: Currently on the Final NPL
Substance ID: U101
Substance: DIMETHYLPHENOL, 2,4-
CAS #: 105-67-9
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: U120
Substance: BENZO(J,K)FLUORENE
CAS #: 206-44-0
Pathway: NO PATHWAY INDICATED
Scoring: 1

NPL Status: Currently on the Final NPL
Substance ID: U220
Substance: TOLUENE
CAS #: 108-88-3
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: U239
Substance: XYLENE
CAS #: 1330-20-7
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: Z999
Substance: MORE THAN 15 SUBSTANCES LISTED
CAS #: Not reported
Pathway: NO PATHWAY INDICATED
Scoring: 1

Summary Details:

Conditions at proposal May 5, 1989): The Utah Power Light/American Barrel Co. Site covers about 2 acres east of 600 West Street and north of South Temple Street in Salt Lake City, Salt Lake County, Utah. The site is in an industriali ed area, with Union Pacific Railroad property to the west

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

and Denver and Rio Grande Western Railroad property to the immediate southeast. A residential area is within 400 feet to the west, and downtown Salt Lake City within 0.5 mile to the east.The property is owned by Utah Power Light UP L), which operated a pole and tie creosote treating facility on the land during the early 1900s, according to records of the Utah Bureau of Solid and Ha ardous Waste. From the 1950s to 1988, American Barrel Co. leased the land for storing drums. In 1986, Meyers Container Corp. purchased from American Barrel all drums fit for reconditioning and removed them to a recycling plant a block south of the site. Meyers also purchased the recycling plant from American Barrel. In mid-1987, an estimated 50,000 mostly empty 55-gallon barrels remained on-site, stacked on their sides to heights up to 20 feet and supported by stones on the ground. Some drums still contained wastes, and soil staining suggested that they may have leaked. During 1987-88, American Barrel removed the barrels, emptied the contents into drums, and transported the materials to disposal facilities regulated under the Resource Conservation andRecovery Act. In July 1988, EPA issued a CERCLA Section 106 Administrative Order on Consent to secure the site. The site is now fenced, locked, and posted. According to EPA tests conducted in 1987, soil 16 feet beneath the site and on-site monitoring wells are contaminated. Among the compounds in shallow ground water are styrene attributable to the barrel yard activities) and polyaromatic hydrocarbons and phenolic compounds attributable to the creosote operations of the early1900s). Shallow ground water is connected to deeper water that within 3 miles of the site provides drinking water to the Salt Lake City Water System, which serves an estimated 377,000 people. An additional 4,000 people are served by privatewells within the 3-mile radius. Status October 4, 1989): EPA is considering various alternatives for the site.

Site Status Details:

NPL Status:	Final
Proposed Date:	05/05/1989
Final Date:	10/04/1989
Deleted Date:	Not reported

Narratives Details:

NPL Name:	UTAH POWER & LIGHT/AMERICAN BARREL CO.
City:	SALT LAKE CITY
State:	UT

CERCLIS:

Site ID:	0800680
EPA ID:	UTD980667240
Facility County:	SALT LAKE
Short Name:	UTAH POWER & LIGHT/AMERIC
Congressional District:	01
IFMS ID:	08B4
SMSA Number:	7160
USGC Hydro Unit:	16020204
Federal Facility:	Not a Federal Facility
DMNSN Number:	4.00000
Site Orphan Flag:	N
RCRA ID:	Not reported
USGS Quadrangle:	Not reported
Site Init By Prog:	Not reported
NFRAP Flag:	Not reported
Parent ID:	Not reported

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

RST Code: O
EPA Region: 08
Classification: Other
Site Settings Code: UR
NPL Status: Currently on the Final NPL
DMNSN Unit Code: ACRE
RBRAC Code: Not reported
RResp Fed Agency Code: Not reported
Non NPL Status: Not reported
Non NPL Status Date: / /
Site Fips Code: 49035
CC Concurrence Date: 09/30/96
CC Concurrence FY: 1996
Alias EPA ID: Not reported
Site FUDS Flag: Not reported

CERCLIS Site Contact Name(s):

Contact ID: 8000099.00000
Contact Name: Armando Saenz
Contact Tel: (303) 312-6559
Contact Title: Remedial Project Manager (RPM)
Contact Email: saenz.armando@epa.gov

Contact ID: 13000438.00000
Contact Name: John Dalton
Contact Tel: (303) 312-6633
Contact Title: Community Involvement Coordinator
Contact Email: dalton.john@epa.gov

CERCLIS Site Alias Name(s):

Alias ID: 201
Alias Name: AMERICAN BARREL
Alias Address: 600 WEST SOUTH TEMPLE
SALT LAKE CITY, UT 84101
Alias ID: 202
Alias Name: UTAH POWER & LIGHT/AMERICAN BARREL CO
Alias Address: Not reported
Not reported
Alias ID: 203
Alias Name: UTAH POWER & LIGHT/AMERICAN BARREL CO.
Alias Address: 600 W SOUTH TEMPLE
SALT LAKE CITY, UT 84101
Alias ID: 201
Alias Comments: AMERICAN BARREL (UTD982584146) WAS DELETED AND COMBINED WITH UTAH POWER & LIGHT(UTD9806667240) ALSO WAS ARCHIVED IN FINDS DATA BASE
Site Description: HAZARDOUS MATERIAL STORED: EMPTY BARRELS THAT AT ONE TIME CONTAINED MALATHION, SODIUM CHROMATE, TRICHLOROETHANE, VARIOUS DEGREASERS & SOLVENTS. BEGAN OPERATION ON UNKNOWN DATE AS BARREL STORAGE, RECYCLING, RECONDITIONING FACILITY.

CERCLIS Assessment History:

Action Code: 001
Action: DISCOVERY
Date Started: / /
Date Completed: 01/01/81
Priority Level: Not reported
Operable Unit: SITEWIDE

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: PRELIMINARY ASSESSMENT
Date Started: / /
Date Completed: 04/01/81
Priority Level: Higher priority for further assessment
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: SITE INSPECTION
Date Started: / /
Date Completed: 05/10/82
Priority Level: Higher priority for further assessment
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: PRELIMINARY ASSESSMENT
Date Started: / /
Date Completed: 04/09/87
Priority Level: Higher priority for further assessment
Operable Unit: SITEWIDE
Primary Responsibility: State, Fund Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: SITE INSPECTION
Date Started: / /
Date Completed: 03/15/88
Priority Level: Higher priority for further assessment
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 003
Action: SITE INSPECTION
Date Started: / /
Date Completed: 06/01/88
Priority Level: Higher priority for further assessment
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: ADMINISTRATIVE ORDER ON CONSENT
Date Started: / /
Date Completed: 07/08/88
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: ADMINISTRATIVE RECORDS
Date Started: 07/10/88
Date Completed: 07/10/88
Priority Level: Admin Record Compiled for a Removal Event
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: POTENTIALLY RESPONSIBLE PARTY REMOVAL
Date Started: 04/14/88
Date Completed: 08/10/88
Priority Level: Stabilized
Operable Unit: SITEWIDE
Primary Responsibility: Responsible Party
Planning Status: Primary
Urgency Indicator: Time Critical
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Action Code: 001
Action: PROPOSAL TO NATIONAL PRIORITIES LIST
Date Started: / /
Date Completed: 05/05/89
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 006
Action: ISSUE REQUEST LETTERS (104E)
Date Started: / /
Date Completed: 06/28/89
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 005
Action: ISSUE REQUEST LETTERS (104E)
Date Started: / /
Date Completed: 09/21/89
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: FINAL LISTING ON NATIONAL PRIORITIES LIST
Date Started: / /
Date Completed: 10/04/89
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: Notice Letters Issued
Date Started: / /

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Date Completed: 03/14/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 005
Action: Notice Letters Issued
Date Started: / /
Date Completed: 03/14/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 003
Action: ISSUE REQUEST LETTERS (104E)
Date Started: / /
Date Completed: 03/14/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 004
Action: Notice Letters Issued
Date Started: / /
Date Completed: 03/23/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: ISSUE REQUEST LETTERS (104E)
Date Started: / /
Date Completed: 03/23/90
Priority Level: Not reported
Operable Unit: SITEWIDE

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: Notice Letters Issued
Date Started: / /
Date Completed: 03/23/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 003
Action: Special Notice Issued
Date Started: / /
Date Completed: 04/19/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: Special Notice Issued
Date Started: / /
Date Completed: 04/19/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: REMEDIAL INVESTIGATION/FEASIBILITY STUDY NEGOTIATIONS
Date Started: 04/19/90
Date Completed: 08/10/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: ADMINISTRATIVE ORDER ON CONSENT
Date Started: / /
Date Completed: 08/10/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: REMOVAL ASSESSMENT
Date Started: 08/30/90
Date Completed: 08/30/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: NATIONAL PRIORITIES LIST RESPONSIBLE PARTY SEARCH
Date Started: 10/23/89
Date Completed: 01/03/91
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: REMOVAL ASSESSMENT
Date Started: 01/01/91
Date Completed: 06/17/91
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Action Code: 001
Action: RISK/HEALTH ASSESSMENT
Date Started: / /
Date Completed: 05/08/92
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: ECOLOGICAL RISK ASSESSMENT
Date Started: / /
Date Completed: 05/08/92
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: AERIAL SURVEY
Date Started: 08/05/92
Date Completed: 05/01/93
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: TREATABILITY STUDY
Date Started: 08/14/92
Date Completed: 05/18/93
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: ISSUE REQUEST LETTERS (104E)
Date Started: / /
Date Completed: 05/19/93

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: POTENTIALLY RESPONSIBLE PARTY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 08/10/90
Date Completed: 07/07/93
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: Responsible Party
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: ADMINISTRATIVE RECORDS
Date Started: 01/02/92
Date Completed: 07/07/93
Priority Level: Admin Record Compiled for a Remedial Event
Operable Unit: SITEWIDE-1
Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 07/07/93
Priority Level: Final Remedy Selected at Site
Operable Unit: SITEWIDE-1
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: Special Notice Issued
Date Started: / /
Date Completed: 07/16/93
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 004
Action: Special Notice Issued
Date Started: / /
Date Completed: 07/16/93
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 003
Action: Notice Letters Issued
Date Started: / /
Date Completed: 07/16/93
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 003
Action: REMOVAL ASSESSMENT
Date Started: 02/18/93
Date Completed: 09/02/93
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS
Date Started: 07/16/93
Date Completed: 07/23/94
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: Lodged By DOJ
Date Started: / /
Date Completed: 12/02/94
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: POTENTIALLY RESPONSIBLE PARTY REMEDIAL DESIGN
Date Started: 09/30/93
Date Completed: 04/25/95
Priority Level: Higher priority for further assessment
Operable Unit: SITEWIDE-1
Primary Responsibility: Responsible Party
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: CONSENT DECREE
Date Started: 07/23/94
Date Completed: 04/26/95
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: POTENTIALLY RESPONSIBLE PARTY REMEDIAL DESIGN
Date Started: 09/18/95
Date Completed: 04/01/96
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: Responsible Party
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Action Code: 001
Action: COMMUNITY INVOLVEMENT
Date Started: 09/04/90
Date Completed: 07/30/96
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: POTENTIALLY RESPONSIBLE PARTY REMEDIAL ACTION
Date Started: 07/23/94
Date Completed: 09/30/96
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: Responsible Party
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: POTENTIALLY RESPONSIBLE PARTY REMEDIAL ACTION
Date Started: 09/18/95
Date Completed: 09/30/96
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: Responsible Party
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: PRELIMINARY CLOSE-OUT REPORT PREPARED
Date Started: / /
Date Completed: 09/30/96
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 004
Action: ISSUE REQUEST LETTERS (104E)
Date Started: / /
Date Completed: 02/27/97
Priority Level: Not reported
Operable Unit: SITEWIDE

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: STATE SUPPORT AGENCY COOPERATIVE AGREEMENT
Date Started: 05/17/90
Date Completed: 09/30/99
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: STATE SUPPORT AGENCY COOPERATIVE AGREEMENT
Date Started: 03/10/92
Date Completed: 09/30/99
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: PREPARATION OF COST DOCUMENT PACKAGE
Date Started: 10/21/99
Date Completed: 03/27/00
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: FIVE-YEAR REVIEW
Date Started: 06/01/01
Date Completed: 09/26/01
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: Responsible Party
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

For detailed financial records, contact EDR for a Site Report.:

Action Code: 002
Action: FIVE-YEAR REVIEW
Date Started: 07/03/06
Date Completed: 09/27/06
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 001
Action: PROSPECTIVE PURCHASER AGREEMENT ASSESSMENT
Date Started: 07/06/07
Date Completed: 06/12/09
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 003
Action: ADMINISTRATIVE ORDER ON CONSENT
Date Started: / /
Date Completed: 06/12/09
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Action Code: 003
Action: FIVE-YEAR REVIEW
Date Started: 12/01/10
Date Completed: 07/26/11
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: EPA In-House
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Action Code: 001
Action: OPERATIONS AND MAINTENANCE
Date Started: 09/30/96
Date Completed: / /
Priority Level: Not reported
Operable Unit: SITEWIDE-1
Primary Responsibility: Responsible Party
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

For detailed financial records, contact EDR for a Site Report.:

Federal Register Details:
Fed Register Date: 10/04/89
Fed Register Volume: 54
Page Number: 41015

Fed Register Date: 05/05/89
Fed Register Volume: 54
Page Number: 19526

Click this hyperlink while viewing on your computer to access
208 additional US CERCLIS Financial: record(s) in the EDR Site Report.

US ENG CONTROLS:
EPA ID: UTD980667240
Site ID: 0800680
Name: UTAH POWER & LIGHT/AMERICAN BARREL CO.
Address: 600 W SOUTH TEMPLE
SALT LAKE CITY, UT 84104
EPA Region: 08
County: SALT LAKE
Event Code: Not reported
Actual Date: 07/07/1993

EPA ID: UTD980667240
Site ID: 0800680
Name: UTAH POWER & LIGHT/AMERICAN BARREL CO.
Address: 600 W SOUTH TEMPLE
SALT LAKE CITY, UT 84104
EPA Region: 08
County: SALT LAKE
Event Code: Not reported
Actual Date: 07/07/1993

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Air Stripping

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Carbon Adsorption

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Discharge

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Natural Attenuation

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Operations & Maintenance (O&M)

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Other, (N.O.S.)

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Publicly Owned Treatment Works (POTW)

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Pump And Treat

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Disposal

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Contaminated Media : Soil
Engineering Control: Excavation

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Incineration

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Other, (N.O.S.)

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Physical Separation

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Residuals Disposal

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Residuals Storage (Temporary)

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Soil Vapor Extraction (in-situ)

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 07/07/1993
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Solidification/Stabilization (Ex-Situ)

US INST CONTROL:
EPA ID: UTD980667240
Site ID: 0800680
Name: UTAH POWER & LIGHT/AMERICAN BARREL CO.

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Action Name: RECORD OF DECISION
Address: 600 W SOUTH TEMPLE
SALT LAKE CITY, UT 84104
EPA Region: 08
County: SALT LAKE
Event Code: Not reported
Inst. Control: Water Supply Use Restriction
Actual Date: 07/07/1993
Complet. Date: 07/07/1993
Operable Unit: 01
Contaminated Media : Groundwater

CONSENT:
EPA ID: UTD980667240
Site ID: Not reported
Case Title: U.S. V. PACIFICORP D/B/A UTAH POWER AND LIGHT COMPANY
Court Num: 94-1162
District: Utah
Entered Date: 19950426
Full-text of the consent decree for this site issued by the United States District Court is available from EDR. Contact your EDR Account Executive.

ROD:
Full-text of USEPA Record of Decision(s) is available from EDR.

ICIS:
Enforcement Action ID: 08-2009-0153
FRS ID: 110002262015
Program ID: CERCLIS UTD980667240
Action Name: UTAH POWER & LIGHT/AMERICAN BARREL SITE
Full Address: 600 W SOUTH TEMPLE SALT LAKE CITY UT 84104
State: Utah
Facility Name: UTAH POWER & LIGHT/AMERICAN BARREL CO.
Facility Address: 600 W SOUTH TEMPLE
SALT LAKE CITY, UT 84104
Enforcement Action Type: CERCLA 122G1B Agrmt For Innocent Landowner
Facility County: SALT LAKE
EPA Region #: 8

Enforcement Action ID: 08-2009-0153
FRS ID: 110002262015
Program ID: RE-POWERING UTD980667240-64022
Action Name: UTAH POWER & LIGHT/AMERICAN BARREL SITE
Full Address: 600 W SOUTH TEMPLE SALT LAKE CITY UT 84104
State: Utah
Facility Name: UTAH POWER & LIGHT/AMERICAN BARREL CO.
Facility Address: 600 W SOUTH TEMPLE
SALT LAKE CITY, UT 84104
Enforcement Action Type: CERCLA 122G1B Agrmt For Innocent Landowner
Facility County: SALT LAKE
EPA Region #: 8

Enforcement Action ID: 08-2009-0153
FRS ID: 110002262015
Program ID: FRS 110002262015

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

Action Name:	UTAH POWER & LIGHT/AMERICAN BARREL SITE
Full Address:	600 W SOUTH TEMPLE SALT LAKE CITY UT 84104
State:	Utah
Facility Name:	UTAH POWER & LIGHT/AMERICAN BARREL CO.
Facility Address:	600 W SOUTH TEMPLE SALT LAKE CITY, UT 84104
Enforcement Action Type:	CERCLA 122G1B Agrmt For Innocent Landowner
Facility County:	SALT LAKE
EPA Region #:	8

Enforcement Action ID:	08-2009-0153
FRS ID:	110002262015
Program ID:	CIM 490000015369
Action Name:	UTAH POWER & LIGHT/AMERICAN BARREL SITE
Full Address:	600 W SOUTH TEMPLE SALT LAKE CITY UT 84104
State:	Utah
Facility Name:	UTAH POWER & LIGHT/AMERICAN BARREL CO.
Facility Address:	600 W SOUTH TEMPLE SALT LAKE CITY, UT 84104
Enforcement Action Type:	CERCLA 122G1B Agrmt For Innocent Landowner
Facility County:	SALT LAKE
EPA Region #:	8

Program ID:	CERCLIS UTD980667240
Facility Name:	UTAH POWER & LIGHT/AMERICAN BARREL CO.
Address:	600 W SOUTH TEMPLE
Tribal Indicator:	N
Fed Facility:	No
NAIC Code:	Not reported
SIC Code:	Not reported

Program ID:	CIM 490000015369
Facility Name:	UTAH POWER & LIGHT/AMERICAN BARREL CO.
Address:	600 W SOUTH TEMPLE
Tribal Indicator:	N
Fed Facility:	No
NAIC Code:	Not reported
SIC Code:	Not reported

Program ID:	FRS 110002262015
Facility Name:	UTAH POWER & LIGHT/AMERICAN BARREL CO.
Address:	600 W SOUTH TEMPLE
Tribal Indicator:	N
Fed Facility:	No
NAIC Code:	Not reported
SIC Code:	Not reported

Program ID:	RE-POWERING UTD980667240-64022
Facility Name:	UTAH POWER & LIGHT/AMERICAN BARREL CO.
Address:	600 W SOUTH TEMPLE
Tribal Indicator:	N
Fed Facility:	No
NAIC Code:	Not reported
SIC Code:	Not reported

UTAH POWER & LIGHT/AMERICAN BARREL CO. (Continued) **1000238438**

PRP:
PRP name:
AMERICAN BARREL AND COOPERAGE CO
AMERICAN BARREL AND COOPERAGE CO
AMERICAN BARREL AND COOPERAGE CO INC
AMERICAN BARREL AND COOPERAGE CO INC
BOISE CASCADE CORP
DENVER AND RIO GRANDE WESTERN RAILROAD
DENVER AND RIO GRANDE WESTERN RAILROAD
DENVER AND RIO GRANDE WESTERN RAILROAD
DENVER AND RIO GRANDE WESTERN RAILROAD
EBASCO SERVICES INC
EBASCO SERVICES INC
EBASCO SERVICES INC
IMACC CORP VARIAN
IMACC CORP VARIAN
IMACC CORP VARIAN
MOUNTAIN FUEL RESOURCES
MOUNTAIN FUEL RESOURCES
PACIFICORP
PACIFICORP
PACIFICORP
PACIFICORP
PACIFICORP
PACIFICORP
PACIFICORP
PACIFICORP
PACIFICORP
SALT LAKE CITY CORP
UNION PACIFIC RAILROAD
UNION PACIFIC RAILROAD
UNION PACIFIC RAILROAD
UNION PACIFIC RAILROAD CO
UTAH POWER AND LIGHT
UTAH POWER AND LIGHT

A7 **CREED LABORATORIES** **ICIS** **1000201238**
NE **15 JERMEY STREET** **FINDS** **N/A**
< 1/8 **SALT LAKE CITY, UT 84104** **UT UST**
0.013 mi.
67 ft. **Site 7 of 10 in cluster A**

Relative:
Lower

Actual:
4232 ft.

ICIS:
Enforcement Action ID: 08-1985-0031
FRS ID: 110011678755
Program ID: CIM 490000002998
Action Name: CREED LABORATORIES & CHEMBRITE, INC.
Full Address: 15 JERMEY STREET SALT LAKE CITY UT 84104-1132
State: Utah
Facility Name: CREED LABORATORIES
Facility Address: 15 JERMEY STREET
SALT LAKE CITY, UT 84104-1132
Enforcement Action Type: FIFRA 14 AO For Comp And Penalties (Old)
Facility County: SALT LAKE
EPA Region #: 8

Enforcement Action ID: 08-1985-0031
FRS ID: 110011678755

CREED LABORATORIES (Continued) **1000201238**

Program ID: FRS 110011678755
Action Name: CREED LABORATORIES & CHEMBRITE, INC.
Full Address: 15 JERMEY STREET SALT LAKE CITY UT 84104-1132
State: Utah
Facility Name: CREED LABORATORIES
Facility Address: 15 JERMEY STREET
SALT LAKE CITY, UT 84104-1132
Enforcement Action Type: FIFRA 14 AO For Comp And Penalties (Old)
Facility County: SALT LAKE
EPA Region #: 8

Enforcement Action ID: 08-1985-0031
FRS ID: 110011678755
Program ID: NCDB C08#WLS716
Action Name: CREED LABORATORIES & CHEMBRITE, INC.
Full Address: 15 JERMEY STREET SALT LAKE CITY UT 84104-1132
State: Utah
Facility Name: CREED LABORATORIES
Facility Address: 15 JERMEY STREET
SALT LAKE CITY, UT 84104-1132
Enforcement Action Type: FIFRA 14 AO For Comp And Penalties (Old)
Facility County: SALT LAKE
EPA Region #: 8

Enforcement Action ID: 08-1985-0031
FRS ID: 110011678755
Program ID: NCDB D08#F-VIII-165C
Action Name: CREED LABORATORIES & CHEMBRITE, INC.
Full Address: 15 JERMEY STREET SALT LAKE CITY UT 84104-1132
State: Utah
Facility Name: CREED LABORATORIES
Facility Address: 15 JERMEY STREET
SALT LAKE CITY, UT 84104-1132
Enforcement Action Type: FIFRA 14 AO For Comp And Penalties (Old)
Facility County: SALT LAKE
EPA Region #: 8

Enforcement Action ID: 08-1985-0031
FRS ID: 110011678755
Program ID: RCRAINFO UTD089326235
Action Name: CREED LABORATORIES & CHEMBRITE, INC.
Full Address: 15 JERMEY STREET SALT LAKE CITY UT 84104-1132
State: Utah
Facility Name: CREED LABORATORIES
Facility Address: 15 JERMEY STREET
SALT LAKE CITY, UT 84104-1132
Enforcement Action Type: FIFRA 14 AO For Comp And Penalties (Old)
Facility County: SALT LAKE
EPA Region #: 8

Enforcement Action ID: 08-1985-0031
FRS ID: 110011678755
Program ID: NCDB I08#198509201691 3
Action Name: CREED LABORATORIES & CHEMBRITE, INC.
Full Address: 15 JERMEY STREET SALT LAKE CITY UT 84104-1132
State: Utah
Facility Name: CREED LABORATORIES

CREED LABORATORIES (Continued) **1000201238**

Facility Address:	15 JERMEY STREET SALT LAKE CITY, UT 84104-1132
Enforcement Action Type:	FIFRA 14 AO For Comp And Penalties (Old)
Facility County:	SALT LAKE
EPA Region #:	8
Enforcement Action ID:	08-1985-0031
FRS ID:	110011678755
Program ID:	NCDB I08#199111261691 2
Action Name:	CREED LABORATORIES & CHEMBRITE, INC.
Full Address:	15 JERMEY STREET SALT LAKE CITY UT 84104-1132
State:	Utah
Facility Name:	CREED LABORATORIES
Facility Address:	15 JERMEY STREET SALT LAKE CITY, UT 84104-1132
Enforcement Action Type:	FIFRA 14 AO For Comp And Penalties (Old)
Facility County:	SALT LAKE
EPA Region #:	8
Enforcement Action ID:	08-1985-0031
FRS ID:	110011678755
Program ID:	NCDB I08#199204141691 1
Action Name:	CREED LABORATORIES & CHEMBRITE, INC.
Full Address:	15 JERMEY STREET SALT LAKE CITY UT 84104-1132
State:	Utah
Facility Name:	CREED LABORATORIES
Facility Address:	15 JERMEY STREET SALT LAKE CITY, UT 84104-1132
Enforcement Action Type:	FIFRA 14 AO For Comp And Penalties (Old)
Facility County:	SALT LAKE
EPA Region #:	8
Enforcement Action ID:	08-1985-0031
FRS ID:	110011678755
Program ID:	NCDB D08#F-VIII-326
Action Name:	CREED LABORATORIES & CHEMBRITE, INC.
Full Address:	15 JERMEY STREET SALT LAKE CITY UT 84104-1132
State:	Utah
Facility Name:	CREED LABORATORIES
Facility Address:	15 JERMEY STREET SALT LAKE CITY, UT 84104-1132
Enforcement Action Type:	FIFRA 14 AO For Comp And Penalties (Old)
Facility County:	SALT LAKE
EPA Region #:	8

Program ID:	CIM 490000002998
Facility Name:	CREED LABORATORIES
Address:	15 JERMEY STREET
Tribal Indicator:	N
Fed Facility:	Not reported
NAIC Code:	Not reported
SIC Code:	2842
Program ID:	FRS 110011678755
Facility Name:	CREED LABORATORIES
Address:	15 JERMEY STREET

CREED LABORATORIES (Continued) **1000201238**

Tribal Indicator: N
Fed Facility: Not reported
NAIC Code: Not reported
SIC Code: 2842

Program ID: NCDB C08#WLS716
Facility Name: CREED LABORATORIES
Address: 15 JERMEY STREET
Tribal Indicator: N
Fed Facility: Not reported
NAIC Code: Not reported
SIC Code: 2842

Program ID: NCDB D08#F-VIII-165C
Facility Name: CREED LABORATORIES
Address: 15 JERMEY STREET
Tribal Indicator: N
Fed Facility: Not reported
NAIC Code: Not reported
SIC Code: 2842

Program ID: NCDB D08#F-VIII-326
Facility Name: CREED LABORATORIES
Address: 15 JERMEY STREET
Tribal Indicator: N
Fed Facility: Not reported
NAIC Code: Not reported
SIC Code: 2842

Program ID: NCDB I08#198509201691 3
Facility Name: CREED LABORATORIES
Address: 15 JERMEY STREET
Tribal Indicator: N
Fed Facility: Not reported
NAIC Code: Not reported
SIC Code: 2842

Program ID: NCDB I08#199111261691 2
Facility Name: CREED LABORATORIES
Address: 15 JERMEY STREET
Tribal Indicator: N
Fed Facility: Not reported
NAIC Code: Not reported
SIC Code: 2842

Program ID: NCDB I08#199204141691 1
Facility Name: CREED LABORATORIES
Address: 15 JERMEY STREET
Tribal Indicator: N
Fed Facility: Not reported
NAIC Code: Not reported
SIC Code: 2842

Program ID: RCRAINFO UTD089326235
Facility Name: CREED LABORATORIES
Address: 15 JERMEY STREET
Tribal Indicator: N

CREED LABORATORIES (Continued) **1000201238**

Fed Facility: Not reported
NAIC Code: Not reported
SIC Code: 2842

FINDS:

Registry ID: 110011678755

Environmental Interest/Information System

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

The CIM (Utah - Common Identifier Mechanism) is Utah's Department of Environmental Quality (UDEQ) mechanism for compliance and permitting operations.

ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

UST:

Facility ID: 4001520
Owner Name: CREED LABORATORIES
Owner Address: P O BOX 2983
Owner City,St,Zip: SALT LAKE CITY, UT 84104
Owner Phone: (801) 595-1800
Total Tanks: 2
Closed Tanks: 2

A8 **CREED LABORATORIES & MFG** **RCRA NonGen / NLR** **1010335555**
NE **15 JEREMY** **UTD089326235**
< 1/8 **SALT LAKE CITY, UT 84104**
0.013 mi.
67 ft. **Site 8 of 10 in cluster A**

Relative:
Lower

Actual:
4232 ft.

RCRA NonGen / NLR:

Date form received by agency:	02/22/2007
Facility name:	CREED LABORATORIES & MFG
Facility address:	15 JEREMY SALT LAKE CITY, UT 84104
EPA ID:	UTD089326235
Mailing address:	JEREMY SALT LAKE CITY, UT 84104
Contact:	JOHN DOE
Contact address:	15 JEREMY SALT LAKE CITY, UT 84104
Contact country:	US
Contact telephone:	(999) 999-9999
Contact email:	Not reported
EPA Region:	08
Land type:	Private
Classification:	Non-Generator
Description:	Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:

Owner/operator name:	CREED LABORATORIES & MFG.
Owner/operator address:	15 JEREMY SALT LAKE CITY, UT 84104
Owner/operator country:	Not reported
Owner/operator telephone:	(999) 999-9999
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Historical Generators:

Date form received by agency:	03/28/2001
Site name:	CREED LABORATORIES & MFG
Classification:	Not a generator, verified

CREED LABORATORIES & MFG (Continued) **1010335555**

Date form received by agency: 01/01/1980
Site name: CREED LABORATORIES & MFG
Classification: Not a generator, verified

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 11/21/1985
Date achieved compliance: 03/26/1986
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/26/1986
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 11/21/1985
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 03/26/1986
Evaluation lead agency: State

Evaluation date: 11/21/1985
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

A9 **LAUNDRY EQUIPMENT PARTS PARTS DISTRIB** **EDR US Hist Cleaners** **1014147524**
SSE **42 JEREMY ST** **N/A**
< 1/8 **SALT LAKE CITY, UT 84104**
0.022 mi.
115 ft. **Site 9 of 10 in cluster A**

Relative: Higher
Actual: 4235 ft.

EDR Historical Cleaners:
Name: LAUNDRY EQUIPMENT PARTS PARTS DISTRIB
Year: 1976
Type: LAUNDRY SUPPLIES AND EQUIPMENT DEALERS

Name: LAUNDRY EQUIPMENT PARTS PARTS DISTRIB
Year: 1985
Type: LAUNDRY SUPPLIES AND EQUIPMENT DEALERS

A10
WNW
< 1/8
0.023 mi.
119 ft.

SERVICE SALES CO WHOL REPR
15 S 9TH WEST ST
SALT LAKE CITY, UT 84104

Site 10 of 10 in cluster A

EDR US Hist Auto Stat **1014173191**
N/A

Relative:
Lower

Actual:
4232 ft.

EDR Historical Auto Stations:

Name:	SERVICE SALES CO WHOL REPR
Year:	1971
Type:	REPAIR SHOPS

11
NNE
< 1/8
0.025 mi.
134 ft.

SPRINT P.O.P.
840 W SOUTH TEMPLE
SALT LAKE CITY, UT 84104

UT UST **U003194529**
UT TIER 2 **N/A**
UT Financial Assurance

Relative:
Lower

Actual:
4231 ft.

UST:

Facility ID:	4002172
Owner Name:	SPRINT
Owner Address:	PO BOX 7994
Owner City,St,Zip:	SHAWNEE MISSION, KS 66207
Owner Phone:	(913) 762-5957
Total Tanks:	1
Closed Tanks:	0

TIER 2:

Site Program Id #:	2127
Department Id #:	Pending411
Site Program Description:	Tier2 Facilities
UTM Northing Zone 12:	425354.77025100001
UTM Easting Zone 12:	4512042.5078199999
State Key:	7096
Map Label:	Tier2 Facilities - 2127

UT Financial Assurance 2:

Region:	2
Facility ID:	4002172
Mechanism:	PST Fund

12
SSE
< 1/8
0.034 mi.
177 ft.

51 JEREMY ST
SALT LAKE CITY, UT 84104

EDR US Hist Auto Stat **1015530173**
N/A

Relative:
Higher

Actual:
4236 ft.

EDR Historical Auto Stations:

Name:	LEES AUTO SERVICE
Year:	1999
Address:	51 JEREMY ST
Name:	LEES AUTO SERVICE
Year:	2000
Address:	51 JEREMY ST
Name:	LEES AUTO SERVICE
Year:	2001

(Continued) **1015530173**

Address: 51 JEREMY ST

Name: LEES AUTO SERVICE
Year: 2002
Address: 51 JEREMY ST

Name: LEES AUTO SERVICE
Year: 2003
Address: 51 JEREMY ST

Name: UNION AUTO
Year: 2004
Address: 51 JEREMY ST

Name: EL COMPADRE AUTO REPAIR
Year: 2007
Address: 51 JEREMY ST

Name: EL COMPADRE AUTO REPAIR
Year: 2008
Address: 51 JEREMY ST

Name: EL COMPADRE AUTO REPAIR
Year: 2009
Address: 51 JEREMY ST

B13 **EDR US Hist Auto Stat** **1015442045**
WSW **35 S 900 W** **N/A**
< 1/8 **SALT LAKE CITY, UT 84104**
0.042 mi.
223 ft. **Site 1 of 2 in cluster B**

Relative:
Higher

Actual:
4233 ft.

EDR Historical Auto Stations:
Name: EL COMPADRE AUTO REPAIR
Year: 2010
Address: 35 S 900 W

Name: EL COMPADRE AUTO REPAIR
Year: 2011
Address: 35 S 900 W

Name: EL COMPADRE AUTO REPAIR
Year: 2012
Address: 35 S 900 W

C14 **TONYS AUTOMOTIVE GENL REPAIR & BODY** **EDR US Hist Auto Stat** **1014197068**
NNW **872 SOUTH TEMPLE ST W** **N/A**
< 1/8 **SALT LAKE CITY, UT 84104**
0.047 mi.
250 ft. **Site 1 of 4 in cluster C**

Relative:
Lower

Actual:
4230 ft.

EDR Historical Auto Stations:
Name: TONYS AUTOMOTIVE GENL REPAIR & BODY
Year: 1985
Type: AUTOMOBILE REPAIRING

C15
NW
< 1/8
0.052 mi.
276 ft.

1 N 900 W
SALT LAKE CITY, UT 84116

Site 2 of 4 in cluster C

EDR US Hist Auto Stat **1015116212**
N/A

Relative:
Lower

Actual:
4230 ft.

EDR Historical Auto Stations:

Name:	GORDON TRANSMISSION & TUNE
Year:	1999
Address:	1 N 900 W
Name:	FLASH GORDON TRANSMISSION
Year:	2000
Address:	1 N 900 W
Name:	FLASH GORDON TRANSMISSION
Year:	2003
Address:	1 N 900 W
Name:	GORDON TRANSMISSION & TUNE UP
Year:	2009
Address:	1 N 900 W
Name:	GORDON TRANSMISSION & TUNE UP
Year:	2011
Address:	1 N 900 W
Name:	FLASH GORDON TRANSMISSION & CL
Year:	2012
Address:	1 N 900 W

B16
SW
< 1/8
0.052 mi.
277 ft.

FAMILY DOLLAR
50 N 900 W
SALT LAKE CITY, UT 84104

Site 2 of 2 in cluster B

UT LUST **U004191028**
UT UST **N/A**

Relative:
Higher

Actual:
4233 ft.

LUST:

Facility ID:	4002469
Release Id:	MXT
Closed Date:	**11/04/2013**
Notification Date:	05/29/2012
Owner Name:	FAMILY DOLLAR
Owner Address:	50 N 900 W
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84104
Owner City,St,Zip:	SALT LAKE CITY, UT 84104
Project Manager:	Morgan Atkinson

UST:

Facility ID:	4002469
Owner Name:	FAMILY DOLLAR
Owner Address:	50 N 900 W
Owner City,St,Zip:	SALT LAKE CITY, UT 84104
Owner Phone:	(801) 550-6958
Total Tanks:	2
Closed Tanks:	2

C17
NW
< 1/8
0.071 mi.
374 ft.

Relative:
Lower

Actual:
4229 ft.

15 N 900 W
SALT LAKE CITY, UT 84116

Site 3 of 4 in cluster C

EDR US Hist Auto Stat **1015236341**
N/A

EDR Historical Auto Stations:

Name: W G W AUTO PERFORMANCE
Year: 2007
Address: 15 N 900 W

Name: WGW AUTO PERFORMANCE
Year: 2010
Address: 15 N 900 W

Name: JUADARRANA AUTO REPAIR
Year: 2011
Address: 15 N 900 W

Name: JUADARRANA AUTO REPAIR
Year: 2012
Address: 15 N 900 W

C18
North
< 1/8
0.072 mi.
380 ft.

Relative:
Lower

Actual:
4229 ft.

867 EMERIL AVE
SALT LAKE CITY, UT 84116

Site 4 of 4 in cluster C

EDR US Hist Auto Stat **1015659365**
N/A

EDR Historical Auto Stations:

Name: SANTA FE AUTO SERVICE
Year: 1999
Address: 867 EMERIL AVE

Name: SANTA FE AUTO SERVICE
Year: 2000
Address: 867 EMERIL AVE

Name: SANTA FE AUTO SERVICE
Year: 2003
Address: 867 EMERIL AVE

Name: SANTA FE AUTO SERVICE
Year: 2004
Address: 867 EMERIL AVE

Name: SANTA FE AUTO SERVICE
Year: 2005
Address: 867 EMERIL AVE

Name: SANTA FE AUTO SERVICE
Year: 2006
Address: 867 EMERIL AVE

Name: SANTA FE AUTO SERVICE
Year: 2007
Address: 867 EMERIL AVE

Name: SANTA FE AUTO SERVICE
Year: 2008

(Continued) **1015659365**

Address: 867 EMERIL AVE

Name: SANTA FE AUTO SERVICE
Year: 2009
Address: 867 EMERIL AVE

D19 **EDR US Hist Auto Stat** **1015634162**
SSW **79 S 900 W** **N/A**
< 1/8 **SALT LAKE CITY, UT 84104**
0.079 mi.
415 ft. **Site 1 of 10 in cluster D**

Relative:
Higher

Actual:
4235 ft.

EDR Historical Auto Stations:

Name: AZTEC AUTO REPAIR
Year: 1999
Address: 79 S 900 W

Name: AZTEC AUTO REPAIR
Year: 2000
Address: 79 S 900 W

Name: AZTEC AUTO REPAIR
Year: 2001
Address: 79 S 900 W

Name: AZTEC AUTO REPAIR
Year: 2002
Address: 79 S 900 W

Name: AZTEC AUTO REPAIR
Year: 2004
Address: 79 S 900 W

Name: AZTECA AUTO REPAIR
Year: 2005
Address: 79 S 900 W

Name: AZTEC AUTO REPAIR
Year: 2010
Address: 79 S 900 W

Name: AZTECA AUTO REPAIR
Year: 2011
Address: 79 S 900 W

Name: AZTECA AUTO REPAIR
Year: 2012
Address: 79 S 900 W

D20
SSW
< 1/8
0.079 mi.
415 ft.

CALDER BROS. CO, INC.
79 S 900 W
SALT LAKE CITY, UT 84124

Site 2 of 10 in cluster D

Relative: Higher

Actual: 4235 ft.

Database(s): UT LUST, UT UST
EDR ID Number: U003150674
EPA ID Number: N/A

LUST:

Facility ID:	4000119
Release Id:	HLL
Closed Date:	**01/12/2011**
Notification Date:	03/24/1992
Owner Name:	CALDER BROS CO INC
Owner Address:	PO BOX 50344
Owner City:	PROVO
Owner State:	UT
Owner Zip:	84605
Owner City,St,Zip:	PROVO, UT 84605
Project Manager:	Hong Lei Tao

UST:

Facility ID:	4000119
Owner Name:	CALDER BROS CO INC
Owner Address:	PO BOX 50344
Owner City,St,Zip:	PROVO, UT 84605
Owner Phone:	(801) 489-3888
Total Tanks:	3
Closed Tanks:	3

E21
ENE
< 1/8
0.080 mi.
423 ft.

FLASH GORDON TRANSMISSION AUTO REPAIRS
1 N 8TH WEST ST
SALT LAKE CITY, UT 84116

Site 1 of 3 in cluster E

Relative: Lower

Actual: 4230 ft.

Database(s): EDR US Hist Auto Stat
EDR ID Number: 1014171522
EPA ID Number: N/A

EDR Historical Auto Stations:

Name:	FLASH GORDON TRANSMISSION AUTO REPAIRS
Year:	1971
Type:	AUTOMOBILE REPAIRING

22
WNW
< 1/8
0.082 mi.
431 ft.

920 W SOUTH TEMPLE
SALT LAKE CITY, UT 84104

Relative: Lower

Actual: 4229 ft.

Database(s): EDR US Hist Auto Stat
EDR ID Number: 1015675348
EPA ID Number: N/A

EDR Historical Auto Stations:

Name:	AUTOCO
Year:	2001
Address:	920 W SOUTH TEMPLE
Name:	AUTOCO
Year:	2002
Address:	920 W SOUTH TEMPLE
Name:	AUTO CO
Year:	2003
Address:	920 W SOUTH TEMPLE

(Continued) **1015675348**

Name: AUTOCO
Year: 2006
Address: 920 W SOUTH TEMPLE

Name: AUTOCO
Year: 2007
Address: 920 W SOUTH TEMPLE

Name: AUTOCO
Year: 2008
Address: 920 W SOUTH TEMPLE

Name: AUTOCO
Year: 2009
Address: 920 W SOUTH TEMPLE

Name: AUTO CO
Year: 2010
Address: 920 W SOUTH TEMPLE

Name: AUTOCO
Year: 2011
Address: 920 W SOUTH TEMPLE

Name: AUTOCO
Year: 2012
Address: 920 W SOUTH TEMPLE

F23 **BULLOUGH INSULATION (FORMER)** **UT LUST** **U003149931**
ESE **50 S 800 W** **UT UST** **N/A**
< 1/8 **SALT LAKE CITY, UT 84104**
0.084 mi.
444 ft. **Site 1 of 8 in cluster F**

Relative:
Higher

Actual:
4239 ft.

LUST:
Facility ID: 4001968
Release Id: IJL
Closed Date: **05/09/1995**
Notification Date: 12/01/1993
Owner Name: TIGER INVESTMENT LC
Owner Address: 171 E SHELLEY LOUISE DRIVE
Owner City: SANDY
Owner State: UT
Owner Zip: 84070
Owner City,St,Zip: SANDY, UT 84070
Project Manager: [Robin Jenkins]

UST:
Facility ID: 4001968
Owner Name: TIGER INVESTMENT LC
Owner Address: 171 E SHELLEY LOUISE DRIVE
Owner City,St,Zip: SANDY, UT 84070
Owner Phone: (801) 571-4200
Total Tanks: 2
Closed Tanks: 2

F24 **MELS LAUNDROMAT** **EDR US Hist Cleaners** **1014143160**
SE **56 S 8TH WEST ST** **N/A**
< 1/8 **SALT LAKE CITY, UT 84104**
0.087 mi.
461 ft. **Site 2 of 8 in cluster F**

Relative:
Higher

Actual:
4239 ft.

EDR Historical Cleaners:
Name: MELS LAUNDROMAT
Year: 1971
Type: LAUNDRIES-SELF SERVE

D25 **EXCELLENT CLNS** **EDR US Hist Cleaners** **1014158167**
SSW **880 W 1ST N** **N/A**
< 1/8 **SALT LAKE CITY, UT**
0.090 mi.
477 ft. **Site 3 of 10 in cluster D**

Relative:
Higher

Actual:
4235 ft.

EDR Historical Cleaners:
Name: EXCELLENT CLEANERS
Year: 1961
Type: CLEANERS AND DYERS

Name: EXCELLENT CLNS
Year: 1965
Type: CLEANERS AND DYERS

D26 **EXCELLENT CLEANEIS** **EDR US Hist Cleaners** **1014146896**
SSW **880 W 1ST NORTH ST** **N/A**
< 1/8 **SALT LAKE CITY, UT 84116**
0.090 mi.
477 ft. **Site 4 of 10 in cluster D**

Relative:
Higher

Actual:
4235 ft.

EDR Historical Cleaners:
Name: EXCELLENT CLEANEIS
Year: 1971
Type: CLEANERS AND DYERS

D27 **VOGUE COMMERCIAL & INDUSTRIAL SUPPLY INC** **EDR US Hist Cleaners** **1014152821**
SSW **906 S 1ST WEST ST** **N/A**
< 1/8 **SALT LAKE CITY, UT 84101**
0.099 mi.
522 ft. **Site 5 of 10 in cluster D**

Relative:
Higher

Actual:
4235 ft.

EDR Historical Cleaners:
Name: VOGUE COMMERCIAL & INDUSTRIAL SUPPLY INC
Year: 1971
Type: CLEANERS AND DYERS

D28 **VOGUE CLQ & SHIRT LNDRY** **EDR US Hist Cleaners** **1014159534**
SSW **906 S 1ST W** **N/A**
< 1/8 **SALT LAKE CITY, UT**
0.099 mi.
522 ft. **Site 6 of 10 in cluster D**

Relative: EDR Historical Cleaners:
Higher Name: VOGUE CLQ & SHIRT LNDRY
Year: 1961
Actual: Type: LAUNDRIES
4235 ft.

D29 **CHICAGO CLNG CO** **EDR US Hist Cleaners** **1014144532**
SSW **902 S 1ST W** **N/A**
< 1/8 **SALT LAKE CITY, UT**
0.099 mi.
522 ft. **Site 7 of 10 in cluster D**

Relative: EDR Historical Cleaners:
Higher Name: CHICAGO CLNG CO
Year: 1926
Actual: Type: CLEANERS, DYERS AND PRESSERS
4235 ft.

D30 **PARAMOUNT CLNRS & DYERS** **EDR US Hist Cleaners** **1014156622**
SSW **902 S 1ST WEST ST** **N/A**
< 1/8 **SALT LAKE CITY, UT**
0.099 mi.
522 ft. **Site 8 of 10 in cluster D**

Relative: EDR Historical Cleaners:
Higher Name: PARAMOUNT CLNRS & DYERS
Year: 1946
Actual: Type: CLEANERS AND DYERS
4235 ft.

E31 **MADSEN BOYD GARAGE AUTO REPAIR** **EDR US Hist Auto Stat** **1014181700**
ENE **10 N 8TH WEST ST** **N/A**
< 1/8 **SALT LAKE CITY, UT 84116**
0.099 mi.
524 ft. **Site 2 of 3 in cluster E**

Relative: EDR Historical Auto Stations:
Lower Name: MADSEN BOYD GARAGE AUTO REPAIR
Year: 1971
Actual: Type: AUTOMOBILE REPAIRING
4229 ft.

F32 **SUGDEN W L AUTO REPR** **EDR US Hist Auto Stat** **1014173046**
ESE **47 S 8TH WEST ST** **N/A**
< 1/8 **SALT LAKE CITY, UT**
0.104 mi.
548 ft. **Site 3 of 8 in cluster F**

Relative: EDR Historical Auto Stations:
Higher Name: REAR SUGDEN WILLARD L AUTO REPR
Year: 1931
Actual: Type: AUTOMOBILE REPAIRERS
4240 ft.

SUGDEN W L AUTO REPR (Continued) **1014173046**

Name: SUGDEN W L AUTO REPR
Year: 1936
Type: AUTOMOBILE REPAIRING

F33 **BRUCE HUSKEY** **EDR US Hist Auto Stat** **1014160764**
SE **79 S 8TH WEST ST** **N/A**
< 1/8 **SALT LAKE CITY, UT 84104**
0.110 mi.
580 ft. **Site 4 of 8 in cluster F**

Relative:
Higher

Actual:
4241 ft.

EDR Historical Auto Stations:
Name: BRUCE HUSKEY
Year: 1971
Type: GASOLINE STATIONS

G34 **SMETHURST LEONARD S AUTO REPR** **EDR US Hist Auto Stat** **1014180845**
WSW **947 FOLSOM AVE** **N/A**
< 1/8 **SALT LAKE CITY, UT**
0.114 mi.
604 ft. **Site 1 of 2 in cluster G**

Relative:
Lower

Actual:
4231 ft.

EDR Historical Auto Stations:
Name: SMETHURST LEONARD S AUTO REPR
Year: 1951
Type: AUTOMOBILE REPAIRING

Name: FLOYDS ANTOMOTIVE REPAIRING
Year: 1961
Type: AUTOMOBILE REPAIRING

Name: FLOYDS AUTOMOTIVE REPR
Year: 1965
Type: AUTOMOBILE REPAIRING

Name: FLOYDS AUTOMOTIVE AUTO REPR
Year: 1971
Type: AUTOMOBILE REPAIRING

Name: FLOYDS AUTOMOTIVE AUTO REPR
Year: 1976
Type: AUTOMOBILE REPAIRING

Name: FLOYDS AUTOMOTIVE AUTO REPR
Year: 1985
Type: AUTOMOBILE REPAIRING

Name: ALEX AUTO SHOP
Year: 2003
Address: 947 FOLSOM AVE

Name: ALEX AUTO SHOP
Year: 2004
Address: 947 FOLSOM AVE

Name: ALEX AUTO SHOP
Year: 2006

SMETHURST LEONARD S AUTO REPR (Continued) **1014180845**

Address: 947 FOLSOM AVE

D35 **ALLEN CLEANERS** **EDR US Hist Cleaners** **1014146335**
SSW **909 S 1ST W** **N/A**
< 1/8 **SALT LAKE CITY, UT**
0.115 mi.
609 ft. **Site 9 of 10 in cluster D**

Relative:
Higher

Actual:
4235 ft.

EDR Historical Cleaners:

Name: ALLEN CLEANERS
Year: 1956
Type: CLEANERS AND DYERS

Name: ALLEN CINS
Year: 1961
Type: CLEANERS AND DYERS

D36 **HANSEN HOME CLEANING RUG** **EDR US Hist Cleaners** **1014149520**
SSW **911 S 1ST W** **N/A**
< 1/8 **SALT LAKE CITY, UT**
0.115 mi.
609 ft. **Site 10 of 10 in cluster D**

Relative:
Higher

Actual:
4235 ft.

EDR Historical Cleaners:

Name: HANSEN HOME CLEANING RUG
Year: 1956
Type: CARPET AND RUG CLEANERS

H37 **ALOHA CLEANERS** **EDR US Hist Cleaners** **1014150861**
SE **802 W 1ST SOUTH ST** **N/A**
< 1/8 **SALT LAKE CITY, UT 84104**
0.116 mi.
612 ft. **Site 1 of 3 in cluster H**

Relative:
Higher

Actual:
4241 ft.

EDR Historical Cleaners:

Name: ALOHA CLEANERS
Year: 1971
Type: CLEANERS AND DYERS

Name: ALOHA CLEANERS
Year: 1976
Type: CLEANERS AND DYERS

E38 **PROGRESSIVE PLATING INC.** **RCRA-CESQG** **1004789024**
ENE **777 WEST SOUTH TEMPLE** **UTR000004937**
< 1/8 **SALT LAKE CITY, UT 84104**
0.117 mi.
619 ft. **Site 3 of 3 in cluster E**

Relative:
Lower

Actual:
4229 ft.

RCRA-CESQG:

Date form received by agency: 04/28/1999
Facility name: PROGRESSIVE PLATING INC.
Facility address: 777 WEST SOUTH TEMPLE

PROGRESSIVE PLATING INC. (Continued) **1004789024**

SALT LAKE CITY, UT 84104
EPA ID: UTR000004937
Mailing address: WEST SOUTH TEMPLE
SALT LAKE CITY, UT 84104
Contact: JASON BROSCHINSKY
Contact address: 777 WEST SOUTH TEMPLE
SALT LAKE CITY, UT 84104
Contact country: US
Contact telephone: (801) 533-9106
Contact email: Not reported
EPA Region: 08
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:
Owner/operator name: JASON BROSCHINSKY
Owner/operator address: 2113 THERESA COVE
WEST VALLEY CITY, UT 84119
Owner/operator country: Not reported
Owner/operator telephone: (801) 977-9928
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: F006

PROGRESSIVE PLATING INC. (Continued) **1004789024**

. Waste name: WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS, EXCEPT FROM THE FOLLOWING PROCESSES: (1) SULFURIC ACID ANODIZING OF ALUMINUM; (2) TIN PLATING ON CARBON STEEL; (3) ZINC PLATING (SEGREGATED BASIS) ON CARBON STEEL; (4) ALUMINUM OR ZINC-ALUMINUM PLATING ON CARBON STEEL; (5) CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC, AND ALUMINUM PLATING ON CARBON STEEL; AND (6) CHEMICAL ETCHING AND MILLING OF ALUMINUM.

Violation Status: No violations found

G39 **EDR US Hist Auto Stat** **1015683702**
WSW **955 FOLSOM AVE** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84104**
0.126 mi.
664 ft. **Site 2 of 2 in cluster G**

Relative: EDR Historical Auto Stations:
Lower
Name: JA FAMILY AUTO SERVICE
Year: 2009
Actual: Address: 955 FOLSOM AVE
4230 ft.

F40 **HICKEYS PHILLIPS 66 SERVICE STATION GAS STA** **EDR US Hist Auto Stat** **1014176498**
SE **776 E 1ST S** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.129 mi.
680 ft. **Site 5 of 8 in cluster F**

Relative: EDR Historical Auto Stations:
Higher
Name: PALMER PHILLIPPS 66 SERVICE STATION
Year: 1956
Actual: Type: GASOLINE STATIONS
4242 ft.

Name: PALMER PHILLIPS 66 SERV STA
Year: 1961
Type: GASOLINE STATIONS

Name: HICKEYS PHILLIPS 66 SERVICE STATION GAS STA
Year: 1965
Type: GASOLINE STATIONS

F41 **TEXAS CO SER STA** **EDR US Hist Auto Stat** **1014187548**
SE **776 E 1ST SOUTH ST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.129 mi.
680 ft. **Site 6 of 8 in cluster F**

Relative: EDR Historical Auto Stations:
Higher
Name: TEXAS CO SER STA
Year: 1941
Actual: Type: GASOLINE AND OIL SERVICE STATIONS
4242 ft.

42
South
1/8-1/4
0.129 mi.
683 ft.

JEREMY STREET LLC
123 S JEREMY ST (840 W)
SALT LAKE CITY, UT 84104

UT LUST **U000813267**
UT UST **N/A**

Relative:
Higher

Actual:
4239 ft.

LUST:

Facility ID:	4001850
Release Id:	NAK
Closed Date:	**04/10/2013**
Notification Date:	04/09/2013
Owner Name:	JEREMY STREET LLC
Owner Address:	663 S 600 W
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84101
Owner City,St,Zip:	SALT LAKE CITY, UT 84101
Project Manager:	UST

UST:

Facility ID:	4001850
Owner Name:	JEREMY STREET LLC
Owner Address:	663 S 600 W
Owner City,St,Zip:	SALT LAKE CITY, UT 84101
Owner Phone:	(801) 455-8800
Total Tanks:	2
Closed Tanks:	2

F43
SE
1/8-1/4
0.132 mi.
697 ft.

EAST SIDE GARAGE
774 E 1ST S
SALT LAKE CITY, UT

Site 7 of 8 in cluster F

EDR US Hist Auto Stat **1014175931**
N/A

Relative:
Higher

Actual:
4242 ft.

EDR Historical Auto Stations:

Name:	EAST SIDE GARAGE
Year:	1926
Type:	AUTOMOBILE GARAGES
Name:	UNITED OIL CO GAS STA
Year:	1951
Type:	GASOLINE STATIONS

F44
SE
1/8-1/4
0.132 mi.
697 ft.

PETERSEN REED B FILL STA
774 E 1ST SOUTH ST
SALT LAKE CITY, UT

Site 8 of 8 in cluster F

EDR US Hist Auto Stat **1014182188**
N/A

Relative:
Higher

Actual:
4242 ft.

EDR Historical Auto Stations:

Name:	PETERSEN REED B FILL STA
Year:	1946
Type:	GASOLINE AND OIL SERVICE STATIONS

H45 **MARSHON LAUNDRY SUPPLIES** **EDR US Hist Cleaners** **1014143009**
SSE **132 S 800 WEST ST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84104**
0.134 mi.
708 ft. **Site 2 of 3 in cluster H**

Relative:
Higher

Actual:
4241 ft.

EDR Historical Cleaners:
Name: MARSHON LAUNDRY SUPPLIES
Year: 1985
Type: LAUNDRY SUPPLIES AND EQUIPMENT DEALERS

I46 **WILFS CONOCO SERV GAS STA** **EDR US Hist Auto Stat** **1014175923**
North **875 N TEMPLE WEST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.138 mi.
730 ft. **Site 1 of 8 in cluster I**

Relative:
Lower

Actual:
4228 ft.

EDR Historical Auto Stations:
Name: WILFS CONOCO SERV GAS STA
Year: 1956
Type: GASOLINE STATIONS

Name: GARYS CONOCO SERV GAS STA
Year: 1961
Type: GASOLINE STATIONS

Name: FAIRWAY CONOCO GAS SERVICE GAS STA
Year: 1965
Type: GASOLINE STATIONS

---

47 **TABCO** **RCRA NonGen / NLR** **1010335630**
SW **940 WEST 100 SOUTH** **UTD117512152**
1/8-1/4 **SALT LAKE CITY, UT 84104**
0.138 mi.
730 ft.

Relative:
Higher

Actual:
4234 ft.

RCRA NonGen / NLR:
Date form received by agency: 01/01/1980
Facility name: TABCO
Facility address: 940 WEST 100 SOUTH
SALT LAKE CITY, UT 84104
EPA ID: UTD117512152
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: US
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 08
Land type: Facility is not located on Indian land. Additional information is not known.
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No

TABCO (Continued) **1010335630**

Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 01/14/1988
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/14/1988
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

I48 **SANITARY CLEANERS** **EDR US Hist Cleaners** **1014152457**
NNW **71 N 9TH W** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.139 mi.
735 ft. **Site 2 of 8 in cluster I**

Relative:
Lower

Actual:
4227 ft.

EDR Historical Cleaners:
Name: SANITARY CLEANERS
Year: 1956
Type: CLEANERS AND DYERS

J49 **OPOULOS AUTOMOTIVE & TOWING** **EDR US Hist Auto Stat** **1014191365**
East **741 SOUTH TEMPLE ST W** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84104**
0.148 mi.
781 ft. **Site 1 of 4 in cluster J**

Relative:
Lower

Actual:
4229 ft.

EDR Historical Auto Stations:
Name: OPOULOS AUTOMOTIVE & TOWING
Year: 1985
Type: AUTOMOBILE REPAIRING

H50 **CITY CAB CO.** **UT LUST** **U003149941**
SE **710 W 100 S** **UT UST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84104**
0.149 mi.
786 ft. **Site 3 of 3 in cluster H**

Relative:
Higher

Actual:
4242 ft.

LUST:

Facility ID:	4001593
Release Id:	KHI
Closed Date:	**08/30/2007**
Notification Date:	11/21/1997
Owner Name:	UTAH DEPARTMENT OF TRANSPORTATION
Owner Address:	480 N 2200 W BLDG B
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84119
Owner City,St,Zip:	SALT LAKE CITY, UT 84119
Project Manager:	Hong Lei Tao

UST:

Facility ID:	4001593
Owner Name:	UTAH DEPARTMENT OF TRANSPORTATION
Owner Address:	480 N 2200 W BLDG B
Owner City,St,Zip:	SALT LAKE CITY, UT 84119
Owner Phone:	(801) 594-6297
Total Tanks:	1
Closed Tanks:	1

J51 **EDR US Hist Auto Stat** **1015622468**
ENE **741 W SOUTH TEMPLE** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84104**
0.151 mi.
798 ft. **Site 2 of 4 in cluster J**

Relative:
Lower

Actual:
4228 ft.

EDR Historical Auto Stations:

Name:	A 1 AUTO REPAIR
Year:	1999
Address:	741 W SOUTH TEMPLE
Name:	A 1 AUTO REPAIR
Year:	2000
Address:	741 W SOUTH TEMPLE
Name:	A 1 AUTO REPAIR
Year:	2007
Address:	741 W SOUTH TEMPLE

I52 **DAVID EARLY #5** **UT LUST** **U003150371**
North **875 W NORTH TEMPLE** **UT UST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.164 mi.
864 ft. **Site 3 of 8 in cluster I**

Relative:
Lower

Actual:
4228 ft.

LUST:

Facility ID:	4001899
Release Id:	IUT
Closed Date:	**11/20/2013**
Notification Date:	01/24/1995

DAVID EARLY #5 (Continued) **U003150371**

Owner Name: DAVID EARLY TIRE INC
Owner Address: P O BOX 45340
Owner City: SALT LAKE CITY
Owner State: UT
Owner Zip: 84145
Owner City,St,Zip: SALT LAKE CITY, UT 84145
Project Manager: Melissa Turchi

UST:
Facility ID: 4001899
Owner Name: DAVID EARLY TIRE INC
Owner Address: P O BOX 45340
Owner City,St,Zip: SALT LAKE CITY, UT 84145
Owner Phone: Not reported
Total Tanks: 4
Closed Tanks: 4

I53 **DAVID EARLY TIRE** **RCRA NonGen / NLR** **1000472450**
North **875 WEST NORTH TEMPLE** **FINDS** **UTD988070140**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.164 mi.
864 ft. **Site 4 of 8 in cluster I**

Relative:
Lower

Actual:
4228 ft.

RCRA NonGen / NLR:
Date form received by agency: 02/18/2010
Facility name: DAVID EARLY TIRE
Site name: FIRESTONE COMPLETE AUTO CARE
Facility address: 875 WEST NORTH TEMPLE
SALT LAKE CITY, UT 84116
EPA ID: UTD988070140
Mailing address: LAKE STEET
BLOOMINGDALE, IL 60108
Contact: JAMES BROADHEAD
Contact address: NORTH TEMPLE
SALT LAKE CITY, UT 84116
Contact country: US
Contact telephone: (801) 328-1782
Contact email: Not reported
EPA Region: 08
Land type: Facility is not located on Indian land. Additional information is not known.
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: DAVID EARLY
Owner/operator address: 1612 EAST 3300 SOUTH
SALT LAKE CITY, UT 84106
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/01/1985
Owner/Op end date: 04/14/2008

Owner/operator name: BFS RETAIL & COMMERCIAL OPERATIONS
Owner/operator address: LAKE STREET
BLOOMINGDALE, IL 60108

DAVID EARLY TIRE (Continued) **1000472450**

Owner/operator country: US
Owner/operator telephone: (801) 328-1782
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 08/04/2008
Owner/Op end date: Not reported

Owner/operator name: DAVID EARLY
Owner/operator address: 1612 EAST 3300 SOUTH
SALT LAKE CITY, UT 84106
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 01/01/1985
Owner/Op end date: 04/14/2008

Owner/operator name: FIRESTONE COMPLETE AUTO CARE
Owner/operator address: NORTH TEMPLE
SALT LAKE CITY, UT 84116
Owner/operator country: US
Owner/operator telephone: (801) 328-1782
Legal status: State
Owner/Operator Type: Operator
Owner/Op start date: 08/04/2008
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D008
. Waste name: LEAD

. Waste code: D018
. Waste name: BENZENE

Historical Generators:
Date form received by agency: 04/14/2008
Site name: DAVID EARLY TIRE

DAVID EARLY TIRE (Continued) **1000472450**

Classification: Not a generator, verified

Date form received by agency: 11/12/1992
Site name: DAVID EARLY TIRE
Classification: Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D008
. Waste name: LEAD

. Waste code: D018
. Waste name: BENZENE

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 04/14/2008
Evaluation: COMPLIANCE ASSISTANCE VISIT
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

FINDS:

Registry ID: 110009507961

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

I54 **EDR US Hist Auto Stat** **1015661053**
North **875 W NORTH TEMPLE** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.164 mi.
864 ft. **Site 5 of 8 in cluster I**

Relative:
Lower

Actual:
4228 ft.

EDR Historical Auto Stations:
Name: DAVID EARLY TIRE & SERVICE CTR
Year: 2004
Address: 875 W NORTH TEMPLE

I55 **CHEVRON USA 72184 RONALD KINYON CHEVRON** **RCRA NonGen / NLR** **1000657257**
North **880 WEST NORTH TEMPLE** **FINDS** **UTD988071205**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.167 mi.
883 ft. **Site 6 of 8 in cluster I**

Relative:
Lower

Actual:
4228 ft.

RCRA NonGen / NLR:

Date form received by agency:	08/18/2009
Facility name:	CHEVRON USA 72184 RONALD KINYON CHEVRON
Facility address:	880 WEST NORTH TEMPLE SALT LAKE CITY, UT 84116
EPA ID:	UTD988071205
Mailing address:	WEST NORTH TEMPLE SALT LAKE CITY, UT 84116
Contact:	RONALD KINYON
Contact address:	880 WEST NORTH TEMPLE SALT LAKE CITY, UT 84116
Contact country:	US
Contact telephone:	(801) 363-8602
Contact email:	Not reported
EPA Region:	08
Land type:	Private
Classification:	Non-Generator
Description:	Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:

Owner/operator name:	CHEVRON USA
Owner/operator address:	PO BOX 220 SEATTLE, WA 98111
Owner/operator country:	Not reported
Owner/operator telephone:	(206) 628-5200
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Historical Generators:

Date form received by agency:	04/30/1991
Site name:	CHEVRON USA 72184 RONALD KINYON CHEVRON
Classification:	Small Quantity Generator

CHEVRON USA 72184 RONALD KINYON CHEVRON (Continued) **1000657257**

. Waste code: D000
. Waste name: Not Defined

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D008
. Waste name: LEAD

. Waste code: D018
. Waste name: BENZENE

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 07/29/2009
Evaluation: COMPLIANCE ASSISTANCE VISIT
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

FINDS:

Registry ID: 110009508050

Environmental Interest/Information System

AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

K56 **CHIPMAN FILLING STA** **EDR US Hist Auto Stat** **1014165742**
NNW **905 N TEMPLE WEST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.169 mi.
893 ft. **Site 1 of 6 in cluster K**

Relative:
Lower

Actual:
4227 ft.

EDR Historical Auto Stations:

Name:	CHIPMAN FILLING STA
Year:	1951
Type:	GASOLINE STATIONS
Name:	CHIPMAN SERV GAS STA
Year:	1956
Type:	GASOLINE STATIONS
Name:	JACKS SERVICE GAS STA
Year:	1961
Type:	GASOLINE STATIONS
Name:	JACKS SERV GAS STA
Year:	1965
Type:	GASOLINE STATIONS

J57 **CARTOW** **UT LUST** **U003149868**
ENE **738 W SOUTH TEMPLE** **UT UST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84104**
0.170 mi.
898 ft. **Site 3 of 4 in cluster J**

Relative:
Lower

Actual:
4228 ft.

LUST:

Facility ID:	4000179
Release Id:	IHV
Closed Date:	**07/17/2002**
Notification Date:	10/18/1993
Owner Name:	CLEARWATER CARTAGE INC
Owner Address:	1800 S 300 W
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84115
Owner City,St,Zip:	SALT LAKE CITY, UT 84115
Project Manager:	[Dale Urban]

UST:

Facility ID:	4000179
Owner Name:	CLEARWATER CARTAGE INC
Owner Address:	1800 S 300 W
Owner City,St,Zip:	SALT LAKE CITY, UT 84115
Owner Phone:	(801) 486-6161
Total Tanks:	5
Closed Tanks:	5

J58 **CLEARWATER TRUCKING** **RCRA NonGen / NLR** **1010335763**
ENE **738 W S TEMPLE** **UTD980804454**
1/8-1/4 **SALT LAKE CITY, UT 84104**
0.170 mi.
898 ft. **Site 4 of 4 in cluster J**

Relative:
Lower

Actual:
4228 ft.

RCRA NonGen / NLR:

Date form received by agency:	02/22/2007
Facility name:	CLEARWATER TRUCKING
Facility address:	738 W S TEMPLE SALT LAKE CITY, UT 84104
EPA ID:	UTD980804454
Mailing address:	P O BOX 87 SALT LAKE CITY, UT 84110
Contact:	STEPHEN LINDSEY
Contact address:	P O BOX 87 SALT LAKE CITY, UT 84110
Contact country:	US
Contact telephone:	(801) 539-8401
Contact email:	Not reported
EPA Region:	08
Land type:	Facility is not located on Indian land. Additional information is not known.
Classification:	Non-Generator
Description:	Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:

Owner/operator name:	STEVE LINDSEY AND OTHERS
Owner/operator address:	DATA NOT REQUESTED DATA NOT REQUESTED, UT 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(999) 999-9999
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Historical Generators:

Date form received by agency:	03/17/1983
Site name:	CLEARWATER TRUCKING
Classification:	Not a generator, verified

CLEARWATER TRUCKING (Continued) **1010335763**

. Waste code: D002
. Waste name: CORROSIVE WASTE

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 02/01/1985
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

I59 **SMITH'S GAS & VIDEO** **UT LUST** **U003150453**
NNW **905 WEST NORTH TEMPLE** **UT UST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.174 mi.
920 ft. **Site 7 of 8 in cluster I**

Relative:
Lower

Actual:
4227 ft.

LUST:
Facility ID: 4000251
Release Id: IUQ
Closed Date: **Not reported**
Notification Date: 01/03/1995
Owner Name: RASSOUL & BAHMAN BEN DADGARI
Owner Address: 4968 S SPRING RUN DR
Owner City: SALT LAKE CITY
Owner State: UT
Owner Zip: 84117
Owner City,St,Zip: SALT LAKE CITY, UT 84117
Project Manager: Melissa Turchi

UST:
Facility ID: 4000251
Owner Name: RASSOUL & BAHMAN BEN DADGARI
Owner Address: 4968 S SPRING RUN DR
Owner City,St,Zip: SALT LAKE CITY, UT 84117
Owner Phone: (801) 685-9394
Total Tanks: 4
Closed Tanks: 4

I60 **EDR US Hist Auto Stat** **1015669832**
NNW **905 W NORTH TEMPLE** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.174 mi.
920 ft. **Site 8 of 8 in cluster I**

Relative:
Lower

Actual:
4227 ft.

EDR Historical Auto Stations:
Name: MOTIS AUTO PERFORMANCE INC
Year: 2008
Address: 905 W NORTH TEMPLE

L61 **NENOW HERB SERV STA GAS STA** **EDR US Hist Auto Stat** **1014163110**
SSE **180 S 8TH W** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.175 mi.
925 ft. **Site 1 of 2 in cluster L**

Relative:
Higher

Actual:
4242 ft.

EDR Historical Auto Stations:
Name: NENOW HERB SERV STA GAS STA
Year: 1961
Type: GASOLINE STATIONS

Name: STARK GLENN AM SERV GAS STA
Year: 1965
Type: GASOLINE STATIONS

L62 **CLIFFS AMERICAN OIL GAS STATION** **EDR US Hist Auto Stat** **1014165798**
SSE **180 S 8TH WEST ST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84104**
0.175 mi.
925 ft. **Site 2 of 2 in cluster L**

Relative:
Higher

Actual:
4242 ft.

EDR Historical Auto Stations:
Name: CLIFFS AMERICAN OIL GAS STATION
Year: 1971
Type: GASOLINE STATIONS

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63 **STAR LAUNDRY** **EDR US Hist Cleaners** **1014148123**
South **151 W 9TH SOUTH ST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.178 mi.
941 ft.

Relative:
Higher

Actual:
4240 ft.

EDR Historical Cleaners:
Name: STAR LAUNDRY
Year: 1941
Type: LAUNDRIES

K64 **EDR US Hist Cleaners** **1015105261**
NNW **910 W NORTH TEMPLE** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.180 mi.
952 ft. **Site 2 of 6 in cluster K**

Relative:
Lower

Actual:
4227 ft.

EDR Historical Cleaners:
Name: CENTURY LAUNDRY
Year: 2003
Address: 910 W NORTH TEMPLE

Name: CENTURY CLEANING BARN
Year: 2005
Address: 910 W NORTH TEMPLE

Name: CENTURY LAUNDRY
Year: 2006
Address: 910 W NORTH TEMPLE

Name: CENTURY LAUNDRY

(Continued) **1015105261**

Year: 2007
Address: 910 W NORTH TEMPLE

Name: CENTURY CLEANING BARN
Year: 2009
Address: 910 W NORTH TEMPLE

Name: CENTURY LAUNDRY
Year: 2009
Address: 910 W NORTH TEMPLE

Name: CENTURY LAUNDRY
Year: 2010
Address: 910 W NORTH TEMPLE

Name: CENTURY CLEANING BARN
Year: 2011
Address: 910 W NORTH TEMPLE

Name: CENTURY CLEANING BARN
Year: 2012
Address: 910 W NORTH TEMPLE

K65 **CENTURY LAUNDRY** **UT DRYCLEANERS** **S106515194**
NNW **910 WEST NORTH TEMPLE** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.180 mi.
952 ft. **Site 3 of 6 in cluster K**

Relative:
Lower

Actual:
4227 ft.

DRYCLEANERS:
Facility ID: UT0801106
Date Installed: Not reported
Out of Business: False
Not Regulated: True
Date of Last Inspection: Not reported
Machines: 0
CoResidential?: Not reported
Mailing Address: Not reported
Mailing City/State/Zip: Not reported
Comments: Not reported

K66 **NENOWS HERB SERVICE GAS STA** **EDR US Hist Auto Stat** **1014163111**
NW **935 N TEMPLE WEST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.182 mi.
961 ft. **Site 4 of 6 in cluster K**

Relative:
Lower

Actual:
4226 ft.

EDR Historical Auto Stations:
Name: NENOWS HERB SERVICE GAS STA
Year: 1965
Type: GASOLINE STATIONS

67
West
1/8-1/4
0.188 mi.
991 ft.

Relative:
Lower

Actual:
4227 ft.

25 S 1000 W
SALT LAKE CITY, UT 84104

EDR US Hist Auto Stat **1015362282**
N/A

EDR Historical Auto Stations:

Name:	R Z AUTO SERVICES
Year:	2004
Address:	25 S 1000 W
Name:	SUPREME AUTO BODY AND REPAIR
Year:	2005
Address:	25 S 1000 W
Name:	R Z AUTO SERVICES
Year:	2006
Address:	25 S 1000 W
Name:	R Z AUTO SERVICES
Year:	2007
Address:	25 S 1000 W
Name:	R Z AUTO SERVICES
Year:	2008
Address:	25 S 1000 W

K68
NW
1/8-1/4
0.206 mi.
1088 ft.

Relative:
Lower

Actual:
4226 ft.

M. KENT FOOTE
935 W NORTH TEMPLE
SALT LAKE CITY, UT 84116
Site 5 of 6 in cluster K

UT LUST **U003150413**
UT UST **N/A**

LUST:

Facility ID:	4001483
Release Id:	FGL
Closed Date:	**03/27/1991**
Notification Date:	08/11/1989
Owner Name:	M KENT FOOTE
Owner Address:	2160 S STATE ST
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84115
Owner City,St,Zip:	SALT LAKE CITY, UT 84115
Project Manager:	[Robin Jenkins]

UST:

Facility ID:	4001483
Owner Name:	M KENT FOOTE
Owner Address:	2160 S STATE ST
Owner City,St,Zip:	SALT LAKE CITY, UT 84115
Owner Phone:	(801) 596-1000
Total Tanks:	4
Closed Tanks:	4

M69 **STAR SERVICE PETROLEUM GAS STA** **EDR US Hist Auto Stat** **1014175922**
NW **955 N TEMPLE WEST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.207 mi.
1092 ft. **Site 1 of 5 in cluster M**

Relative:
Lower

Actual:
4225 ft.

EDR Historical Auto Stations:

Name:	FAIRGROUNDS FLYING A SERVICE GAS STA
Year:	1956
Type:	GASOLINE STATIONS
Name:	FAIRGROUND SERVICE GAS STA
Year:	1961
Type:	GASOLINE STATIONS
Name:	STAR SERVICE PETROLEUM GAS STA
Year:	1965
Type:	GASOLINE STATIONS

K70 **QUALITY OIL CO SER STA** **EDR US Hist Auto Stat** **1014168247**
NNW **980 NORTH TEMPLE ST W** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.213 mi.
1122 ft. **Site 6 of 6 in cluster K**

Relative:
Lower

Actual:
4226 ft.

EDR Historical Auto Stations:

Name:	QUALITY OIL CO SER STA
Year:	1941
Type:	GASOLINE AND OIL SERVICE STATIONS

M71 **BROWN LEE CLEANERS** **EDR US Hist Cleaners** **1014144419**
NW **963 N TEMPLE WEST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT**
0.215 mi.
1134 ft. **Site 2 of 5 in cluster M**

Relative:
Lower

Actual:
4225 ft.

EDR Historical Cleaners:

Name:	BROWN LEE CLEANERS
Year:	1946
Type:	CLEANERS AND DYERS
Name:	SANITARY CLNS & DYERS
Year:	1951
Type:	CLEANERS AND DYERS
Name:	GLOBE CLEANERS
Year:	1956
Type:	CLEANERS AND DYERS
Name:	GLOBE CLNS
Year:	1961
Type:	CLEANERS AND DYERS
Name:	GLOBE CLNS
Year:	1965
Type:	CLEANERS AND DYERS

N72 **MINIT-LUBE #1020** **UT LUST** **U003544846**
NE **757 W NORTH TEMPLE** **UT UST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.217 mi.
1148 ft. **Site 1 of 3 in cluster N**

Relative:
Lower

Actual:
4228 ft.

LUST:

Facility ID:	4000304
Release Id:	GZO
Closed Date:	**05/05/1995**
Notification Date:	07/26/1991
Owner Name:	FLYING J INC
Owner Address:	333 W CENTER ST
Owner City:	NORTH SALT LAKE
Owner State:	UT
Owner Zip:	84054
Owner City,St,Zip:	NORTH SALT LAKE, UT 84054
Project Manager:	[Dale Urban]

Facility ID:	4000575
Release Id:	ILW
Closed Date:	**02/16/1994**
Notification Date:	02/10/1994
Owner Name:	Q LUBE INC
Owner Address:	1385 W 2200 S
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84119
Owner City,St,Zip:	SALT LAKE CITY, UT 84119
Project Manager:	[Jim Martin]

UST:

Facility ID:	4000304
Owner Name:	FLYING J INC
Owner Address:	333 W CENTER ST
Owner City,St,Zip:	NORTH SALT LAKE, UT 84054
Owner Phone:	(801) 296-7716
Total Tanks:	4
Closed Tanks:	4

Total Tanks:	5
Closed Tanks:	5

N73 **MINIT-LUBE #1020** **RCRA NonGen / NLR** **1000472385**
NE **757 WEST NORTH TEMPLE** **FINDS** **UTD988069233**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.217 mi.
1148 ft. **Site 2 of 3 in cluster N**

Relative:
Lower

Actual:
4228 ft.

RCRA NonGen / NLR:

Date form received by agency:	08/06/2007
Facility name:	MINIT-LUBE #1020
Facility address:	757 WEST NORTH TEMPLE SALT LAKE CITY, UT 84116
EPA ID:	UTD988069233
Mailing address:	WEST NORTH TEMPLE SALT LAKE CITY, UT 84116
Contact:	JOE MONTOYA
Contact address:	757 WEST NORTH TEMPLE

MINIT-LUBE #1020 (Continued) **1000472385**

SALT LAKE CITY, UT 84116
Contact country: US
Contact telephone: (801) 355-1385
Contact email: Not reported
EPA Region: 08
Land type: Facility is not located on Indian land. Additional information is not known.
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: QUAKER STATE MINIT-LUBE INC
Owner/operator address: DATA NOT REQUESTED
DATA NOT REQUESTED, UT 99999
Owner/operator country: Not reported
Owner/operator telephone: (999) 999-9999
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 10/25/1990
Site name: MINIT-LUBE #1020
Classification: Small Quantity Generator

. Waste code: D000
. Waste name: Not Defined

. Waste code: D008
. Waste name: LEAD

. Waste code: D018
. Waste name: BENZENE

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 08/02/2007

MINIT-LUBE #1020 (Continued) **1000472385**

Evaluation: COMPLIANCE ASSISTANCE VISIT
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

FINDS:

Registry ID: 110009507881

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

N74 **EDR US Hist Auto Stat** **1015626915**
NE **757 W NORTH TEMPLE** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.217 mi.
1148 ft. **Site 3 of 3 in cluster N**

Relative:
Lower

Actual:
4228 ft.

EDR Historical Auto Stations:

Name: Q LUBE
Year: 2000
Address: 757 W NORTH TEMPLE

Name: Q LUBE
Year: 2003
Address: 757 W NORTH TEMPLE

Name: JIFFY LUBE
Year: 2005
Address: 757 W NORTH TEMPLE

Name: JIFFY LUBE
Year: 2006
Address: 757 W NORTH TEMPLE

Name: JIFFY LUBE INTERNATIONAL INC
Year: 2007
Address: 757 W NORTH TEMPLE

Name: JIFFY LUBE INTERNATIONAL INC
Year: 2008
Address: 757 W NORTH TEMPLE

Name: JIFFY LUBE INTERNATIONAL INC
Year: 2009
Address: 757 W NORTH TEMPLE

Name: JIFFY LUBE
Year: 2010
Address: 757 W NORTH TEMPLE

Name: JIFFY LUBE

(Continued) **1015626915**

Year: 2011
Address: 757 W NORTH TEMPLE

Name: JIFFY LUBE
Year: 2012
Address: 757 W NORTH TEMPLE

M75 **RED HANGER INC # 12** **RCRA NonGen / NLR** **1000116751**
NW **955 WEST NORTH TEMPLE** **FINDS** **UTD056917370**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.223 mi.
1180 ft. **Site 3 of 5 in cluster M**

Relative:
Lower

Actual:
4226 ft.

RCRA NonGen / NLR:
Date form received by agency: 06/26/2014
Facility name: RED HANGER INC # 12
Facility address: 955 WEST NORTH TEMPLE
SALT LAKE CITY, UT 84116
EPA ID: UTD056917370
Mailing address: P.O. BOX 1114
SALT LAKE CITY, UT 84110
Contact: BRAD OVERMOE
Contact address: P.O. BOX 1114
SALT LAKE CITY, UT 84110
Contact country: US
Contact telephone: (801) 355-6935
Contact email: BRADO@REDHANGER.COM
EPA Region: 08
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: RED HANGER
Owner/operator address: 955 WEST NORTH TEMPLE
SALT LAKE CITY, UT 84116
Owner/operator country: US
Owner/operator telephone: (801) 355-6935
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/01/1980
Owner/Op end date: Not reported

Owner/operator name: TERRY OVERMOE
Owner/operator address: P.O. BOX 1114
SALT LAKE CITY, UT 84110
Owner/operator country: US
Owner/operator telephone: (801) 355-6935
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 01/01/1980
Owner/Op end date: Not reported

Owner/operator name: TERRY OVERMOE
Owner/operator address: DATA NOT REQUESTED
DATA NOT REQUESTED, UT 99999
Owner/operator country: Not reported
Owner/operator telephone: (999) 999-9999

RED HANGER INC # 12 (Continued) **1000116751**

Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 05/14/2009
Site name: RED HANGER INC # 12
Classification: Conditionally Exempt Small Quantity Generator

. Waste code: F002
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Date form received by agency: 10/14/1986
Site name: RED HANGER INC # 12
Classification: Small Quantity Generator

. Waste code: F002
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Violation Status: No violations found

FINDS:

RED HANGER INC # 12 (Continued) **1000116751**

Registry ID: 110005197599

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

M76 **EDR US Hist Cleaners** **1015108483**
NW **955 W NORTH TEMPLE** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.223 mi.
1180 ft. **Site 4 of 5 in cluster M**

Relative:
Lower

Actual:
4226 ft.

EDR Historical Cleaners:

Name:	RED HANGER CLEANERS STORES
Year:	2001
Address:	955 W NORTH TEMPLE
Name:	RED HANGER CLEANERS
Year:	2002
Address:	955 W NORTH TEMPLE
Name:	RED HANGER CLEANERS
Year:	2003
Address:	955 W NORTH TEMPLE
Name:	RED HANGER CLEANERS
Year:	2005
Address:	955 W NORTH TEMPLE
Name:	RED HANGER CLEANERS
Year:	2006
Address:	955 W NORTH TEMPLE
Name:	RED HANGER CLEANERS
Year:	2007
Address:	955 W NORTH TEMPLE
Name:	RED HANGER CLEANERS
Year:	2008
Address:	955 W NORTH TEMPLE
Name:	RED HANGER CLEANERS
Year:	2010
Address:	955 W NORTH TEMPLE
Name:	RED HANGER CLEANERS
Year:	2011
Address:	955 W NORTH TEMPLE
Name:	RED HANGER CLEANERS
Year:	2012
Address:	955 W NORTH TEMPLE

M77 **7-ELEVEN 1851-24573** **UT LUST** **U003150448**
NW **960 W NORTH TEMPLE** **UT UST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116** **UT Financial Assurance**
0.227 mi.
1198 ft. **Site 5 of 5 in cluster M**

Relative:
Lower

Actual:
4226 ft.

LUST:

Facility ID:	4001026
Release Id:	FCS
Closed Date:	**12/18/1990**
Notification Date:	02/13/1989
Owner Name:	7-ELEVEN INC
Owner Address:	PO BOX 711
Owner City:	DALLAS
Owner State:	TX
Owner Zip:	75221
Owner City,St,Zip:	DALLAS, TX 75221
Project Manager:	[Shelly Quick]

Facility ID:	4001026
Release Id:	KZR
Closed Date:	**03/26/2012**
Notification Date:	07/28/1999
Owner Name:	7-ELEVEN INC
Owner Address:	PO BOX 711
Owner City:	DALLAS
Owner State:	TX
Owner Zip:	75221
Owner City,St,Zip:	DALLAS, TX 75221
Project Manager:	Mike Pecorelli

UST:

Facility ID:	4001026
Owner Name:	7-ELEVEN INC
Owner Address:	PO BOX 711
Owner City,St,Zip:	DALLAS, TX 75221
Owner Phone:	(214) 415-0146
Total Tanks:	3
Closed Tanks:	1

UT Financial Assurance 2:

Region:	2
Facility ID:	4001026
Mechanism:	Self-insurance

O78 **FRESH MARKET 2383** **UT LUST** **U003150373**
NNW **140 NORTH 900 WEST** **UT UST** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84116** **UT Financial Assurance**
0.231 mi.
1218 ft. **Site 1 of 2 in cluster O**

Relative:
Lower

Actual:
4228 ft.

LUST:

Facility ID:	4000211
Release Id:	HCE
Closed Date:	**03/17/1997**
Notification Date:	09/18/1991
Owner Name:	ASSOCIATED FRESH MARKETS, INC.
Owner Address:	1850 W 2100 S
Owner City:	SALT LAKE CITY

FRESH MARKET 2383 (Continued) **U003150373**

Owner State: UT
Owner Zip: 84119
Owner City,St,Zip: SALT LAKE CITY, UT 84119
Project Manager: [Dale Urban]

Facility ID: 4000211
Release Id: LOI
Closed Date: 08/30/2006
Notification Date: 05/31/2002
Owner Name: ASSOCIATED FRESH MARKETS, INC.
Owner Address: 1850 W 2100 S
Owner City: SALT LAKE CITY
Owner State: UT
Owner Zip: 84119
Owner City,St,Zip: SALT LAKE CITY, UT 84119
Project Manager: Mike Pecorelli

UST:
Facility ID: 4000211
Owner Name: ASSOCIATED FRESH MARKETS, INC.
Owner Address: 1850 W 2100 S
Owner City,St,Zip: SALT LAKE CITY, UT 84119
Owner Phone: (801) 973-4400
Total Tanks: 6
Closed Tanks: 4

UT Financial Assurance 2:
Region: 2
Facility ID: 4000211
Mechanism: Insurance

---

79 **VIA WEST** **UT UST** **U003167791**
SW **118 S 1000 W** **UT Financial Assurance** **N/A**
1/8-1/4 **SALT LAKE CITY, UT 84104**
0.233 mi.
1230 ft.

Relative:
Lower

Actual:
4231 ft.

UST:
Facility ID: 4002142
Owner Name: VIAWEST
Owner Address: 118 S 1000 W
Owner City,St,Zip: SALT LAKE CITY, UT 84104
Owner Phone: (801) 617-2921
Total Tanks: 1
Closed Tanks: 0

UT Financial Assurance 2:
Region: 2
Facility ID: 4002142
Mechanism: Self-insurance

O80 **RITE AID #6137** **RCRA-SQG** **1014927833**
NNW **150 NORTH 900 WEST** **UTR000011866**
1/8-1/4 **SALT LAKE CITY, UT 84116**
0.245 mi.
1292 ft. **Site 2 of 2 in cluster O**

Relative:
Lower

Actual:
4228 ft.

RCRA-SQG:

Date form received by agency:	09/15/2014
Facility name:	RITE AID #6137
Facility address:	150 NORTH 900 WEST SALT LAKE CITY, UT 84116
EPA ID:	UTR000011866
Mailing address:	30 HUNTER LANE CAMP HILL, PA 17011
Contact:	STEPHANIE A CAIATI
Contact address:	30 HUNTER LANE CAMP HILL, PA 17011
Contact country:	US
Contact telephone:	(717) 730-8225
Contact email:	SSCAIATI@RITEAID.COM
EPA Region:	08
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	RITE AID CORPORATION
Owner/operator address:	30 HUNTER LANE CAMP HILL, PA 17011
Owner/operator country:	US
Owner/operator telephone:	(717) 761-2633
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	05/08/1997
Owner/Op end date:	Not reported

Owner/operator name:	RITE AID CORPORATION
Owner/operator address:	900 WEST SALT LAKE CITY, UT 84116
Owner/operator country:	US
Owner/operator telephone:	(717) 730-8225
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	05/08/1997
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No

RITE AID #6137 (Continued) **1014927833**

Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D009
. Waste name: MERCURY

. Waste code: D010
. Waste name: SELENIUM

. Waste code: D024
. Waste name: M-CRESOL

. Waste code: P001
. Waste name: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

. Waste code: P075
. Waste name: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

Historical Generators:
Date form received by agency: 11/15/2011
Site name: RITE AID #6137
Classification: Conditionally Exempt Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D009
. Waste name: MERCURY

. Waste code: D010
. Waste name: SELENIUM

. Waste code: D024
. Waste name: M-CRESOL

RITE AID #6137 (Continued) **1014927833**

. Waste code: P001
. Waste name: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

. Waste code: P075
. Waste name: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

Violation Status: No violations found

81
SSW
1/8-1/4
0.250 mi.
1319 ft.

VOGUE CLEANING & SHIRT LAUNDRY **UT DRYCLEANERS** **S106515151**
906 WEST 2ND SOUTH **N/A**
SALT LAKE CITY, UT 84104

Relative:
Higher

Actual:
4242 ft.

DRYCLEANERS:
Facility ID: UT0801054
Date Installed: Not reported
Out of Business: False
Not Regulated: True
Date of Last Inspection: Not reported
Machines: 0
CoResidential?: Not reported
Mailing Address: Not reported
Mailing City/State/Zip: Not reported
Comments: Not reported

82
NE
1/4-1/2
0.264 mi.
1395 ft.

WONDER HOSTESS BAKERY THRIFT SHOP **UT LUST** **U003150386**
708 W NORTH TEMPLE **UT UST** **N/A**
SALT LAKE CITY, UT 84116

Relative:
Higher

Actual:
4236 ft.

LUST:
Facility ID: 4000190
Release Id: LZH
Closed Date: **06/19/2006**
Notification Date: 07/11/2005
Owner Name: INTERSTATE BRANDS CORPORATION
Owner Address: P O BOX 108
Owner City: OGDEN
Owner State: UT
Owner Zip: 84402
Owner City,St,Zip: OGDEN, UT 84402
Project Manager: Melissa Turchi

UST:
Facility ID: 4000190
Owner Name: INTERSTATE BRANDS CORPORATION
Owner Address: P O BOX 108
Owner City,St,Zip: OGDEN, UT 84402
Owner Phone: (814) 502-4000
Total Tanks: 2
Closed Tanks: 2

83
SW
1/4-1/2
0.292 mi.
1540 ft.

OLD GAS STATION
180 S 1000 W
SALT LAKE CITY, UT 84104

UT LUST **U003150682**
UT UST **N/A**

Relative:
Lower

Actual:
4232 ft.

LUST:

Facility ID:	4002113
Release Id:	LJJ
Closed Date:	**07/28/2003**
Notification Date:	04/10/2001
Owner Name:	SALT LAKE NEIGHBORHOOD HOUSING SERVICES
Owner Address:	622 W 500 N
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84116
Owner City,St,Zip:	SALT LAKE CITY, UT 84116
Project Manager:	[Dale Urban]

UST:

Facility ID:	4002113
Owner Name:	SALT LAKE NEIGHBORHOOD HOUSING SERVICES
Owner Address:	622 W 500 N
Owner City,St,Zip:	SALT LAKE CITY, UT 84116
Owner Phone:	(801) 539-1590
Total Tanks:	2
Closed Tanks:	2

P84
WSW
1/4-1/2
0.307 mi.
1620 ft.

S.L. NORTH SERVICE STATION
1070 W 100 S
SALT LAKE CITY, UT 84104
Site 1 of 3 in cluster P

UT LUST **U003149851**
UT UST **N/A**

Relative:
Lower

Actual:
4227 ft.

LUST:

Facility ID:	4000627
Release Id:	GKB
Closed Date:	**04/18/1994**
Notification Date:	12/03/1990
Owner Name:	QUESTAR REGULATED SERVICES
Owner Address:	P O BOX 45360 M/S DNR 206
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84145
Owner City,St,Zip:	SALT LAKE CITY, UT 84145
Project Manager:	[Rocky Stonestreet]

UST:

Facility ID:	4000627
Owner Name:	QUESTAR REGULATED SERVICES
Owner Address:	P O BOX 45360 M/S DNR 206
Owner City,St,Zip:	SALT LAKE CITY, UT 84145
Owner Phone:	(801) 558-7837
Total Tanks:	3
Closed Tanks:	3

P85
WSW
1/4-1/2
0.318 mi.
1680 ft.

MOUNTAIN FUELS SUPPLY CO.-OPERATIONS CTR
100 SOUTH 1078 WEST
SALT LAKE CITY, UT 84104

CERC-NFRAP

1003026130
UTD980807234

Site 2 of 3 in cluster P

Relative:
Lower

Actual:
4227 ft.

CERC-NFRAP:
Site ID: 0800693
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: NFRAP-Site does not qualify for the NPL based on existing information

CERCLIS-NFRAP Site Contact Details:
Contact Sequence ID: 13385448.00000
Person ID: 13002897.00000

CERCLIS-NFRAP Assessment History:
Action: PRELIMINARY ASSESSMENT
Date Started: / /
Date Completed: 12/01/84
Priority Level: Low priority for further assessment

Action: DISCOVERY
Date Started: / /
Date Completed: 10/01/83
Priority Level: Not reported

Action: ARCHIVE SITE
Date Started: / /
Date Completed: 10/02/90
Priority Level: Not reported

Action: SITE INSPECTION
Date Started: / /
Date Completed: 10/02/90
Priority Level: NFRAP-Site does not qualify for the NPL based on existing information

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86
WNW
1/4-1/2
0.318 mi.
1681 ft.

GRANITE MILL IND. COMPLEX
1055 W NORTH TEMPLE
SALT LAKE CITY, UT 84116

UT LUST
UT UST

U003150418
N/A

Relative:
Lower

Actual:
4224 ft.

LUST:
Facility ID: 4001638
Release Id: GIX
Closed Date: 06/19/1995
Notification Date: 11/26/1990
Owner Name: THE BOYER COMPANY
Owner Address: 90 SOUTH 400 WEST STE 200
Owner City: SALT LAKE CITY
Owner State: UT
Owner Zip: 84101
Owner City,St,Zip: SALT LAKE CITY, UT 84101
Project Manager: [Rocky Stonestreet]

UST:
Facility ID: 4001638

GRANITE MILL IND. COMPLEX (Continued) **U003150418**

Owner Name: THE BOYER COMPANY
Owner Address: 90 SOUTH 400 WEST STE 200
Owner City,St,Zip: SALT LAKE CITY, UT 84101
Owner Phone: (801) 366-7156
Total Tanks: 2
Closed Tanks: 2

P87 **MOUNTAIN FUELS SUPPLY CO** **EDR MGP** **1008409003**
WSW **1078 W 100 SOUTH** **N/A**
1/4-1/2 **SALT LAKE CITY, UT 84101**
0.320 mi.
1691 ft. **Site 3 of 3 in cluster P**

Relative:
Lower

Manufactured Gas Plants:
Alternate Name:UTAH GAS AND COKE CO. Years of Operation: 1906-1929

Actual:
4227 ft.

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88 **EIMCO PROCESS EQUIPMENT CO.** **UT LUST** **U003150660**
SE **669 W 200 S** **UT UST** **N/A**
1/4-1/2 **SALT LAKE CITY, UT 84140** **UT NPDES**
0.357 mi.
1883 ft.

Relative:
Lower

Actual:
4231 ft.

LUST:
Facility ID: 4001428
Release Id: FHI
Closed Date: **07/03/1995**
Notification Date: 09/21/1989
Owner Name: EIMCO PROCESS EQUIPMENT CO
Owner Address: 669 W 2ND S
Owner City: SALT LAKE CITY
Owner State: UT
Owner Zip: 84140
Owner City,St,Zip: SALT LAKE CITY, UT 84140
Project Manager: [Shelly Quick]

Facility ID: 4001428
Release Id: GHT
Closed Date: **05/11/1995**
Notification Date: 10/12/1990
Owner Name: EIMCO PROCESS EQUIPMENT CO
Owner Address: 669 W 2ND S
Owner City: SALT LAKE CITY
Owner State: UT
Owner Zip: 84140
Owner City,St,Zip: SALT LAKE CITY, UT 84140
Project Manager: [Shelly Quick]

UST:
Facility ID: 4001428
Owner Name: EIMCO PROCESS EQUIPMENT CO
Owner Address: 669 W 2ND S
Owner City,St,Zip: SALT LAKE CITY, UT 84140
Owner Phone: (801) 526-2000
Total Tanks: 2

EIMCO PROCESS EQUIPMENT CO. (Continued) **U003150660**

Closed Tanks: 2

NPDES:

Permit:	UTR368515
Facility Contact Name:	Not reported
Issue Date:	Not reported
Expiration Date:	08/22/2015
State Water Body Name:	Jordan River
NonConstruction Storm Water:	STORMWATER
Facility Oper Name:	Arnell-West, Inc.
Facility Oper Address:	3441 S. 2200 W. #103
Facility Oper City:	SALT LAKE CITY
Facility Oper State:	UT
Facility Oper Zip:	84119
Facility Oper Phone #:	801-509-1801
Status Of Owner/Oper:	MAIN
Facility Oper Contact Person:	Lonnie Kimbell
Facility Oper Contact Title:	Not reported
Facility Oper Contact Phone:	801-509-1801
Facility Site Contact Person:	Not reported
Facility Site Contact Tile:	Not reported
Facility Site Contact Phone:	Not reported
Muni Operating Storm Sewer System:	Salt Lake City
Receiving Water Body:	Jordan River
Primary SIC Code:	Not reported
Group 1:	Not reported
Group 2:	Not reported
Group 3:	Not reported
Group 4:	Not reported
Group 5:	Not reported
Primary Sector:	Not reported
Secondary Sector:	Not reported
Third Sector:	Not reported
Fourth Sector:	Not reported
Certification Name:	Lonnie Kimbell
Date Signed:	08/22/2014
Amount Paid:	$150.00
Date Noi Received:	08/22/2014
Date Noi Complete:	Not reported
Date Coverage Issued/Renewed:	Not reported
Date Coverage Effective:	08/22/2014
Date Coverage Expires:	08/22/2015
Inactivated:	Not reported
No Exposure:	0
Not Received:	Not reported
Permit Type:	CONSTRUCTION
Permit Name:	Not reported
DMR Cognizant Official:	Not reported
DMR Cognizant Official Tele:	Not reported
Facility Site Lat:	40.763483
Facility Site Long:	-111.91073

Q89 **AIRPORT TRAX 650 WEST** **UT LUST** **U004179164**
ENE **650 W NORTH TEMPLE** **UT UST** **N/A**
1/4-1/2 **SALT LAKE CITY, UT 84101**
0.359 mi.
1895 ft. **Site 1 of 2 in cluster Q**

Relative:
Higher

Actual:
4234 ft.

LUST:

Facility ID:	4002453
Release Id:	MTH
Closed Date:	**03/14/2011**
Notification Date:	02/24/2011
Owner Name:	UTAH TRANSIT AUTHORITY
Owner Address:	PO BOX 30810
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84130
Owner City,St,Zip:	SALT LAKE CITY, UT 84130
Project Manager:	UST

UST:

Facility ID:	4002453
Owner Name:	UTAH TRANSIT AUTHORITY
Owner Address:	PO BOX 30810
Owner City,St,Zip:	SALT LAKE CITY, UT 84130
Owner Phone:	(801) 287-3064
Total Tanks:	2
Closed Tanks:	2

Q90 **FORMER RANCHO LANES** **UT LAST** **S106560674**
ENE **641 WEST NORTH TEMPLE** **N/A**
1/4-1/2 **SALT LAKE CITY, UT**
0.375 mi.
1981 ft. **Site 2 of 2 in cluster Q**

Relative:
Higher

Actual:
4234 ft.

LAST:

Facility ID:	4002292
Release ID:	LKE
Site Type:	AST w/RP Lead
Federal Registered:	False
Date Closed:	**4/10/2002**

R91 **UTAH POWER AND LIGHT AMERICAN BARREL CO.** **UT INST CONTROL** **S117449560**
East **600 W SOUTH TEMPLE** **N/A**
1/4-1/2 **SALT LAKE CITY, UT 84104**
0.379 mi.
2001 ft. **Site 1 of 3 in cluster R**

Relative:
Higher

Actual:
4235 ft.

INST CONTROL:

Facility Id:	UTD980667240
Doc #:	DERR-2011-008409
Sub Program:	Final Reports
Doc Date:	03/21/2011
Title:	LUR Final - Environmental Covenant
PM:	Chad Gilgen
Branch:	CERCLA Branch
PGM:	Superfund
Division:	DERR

R92
East
1/4-1/2
0.379 mi.
2001 ft.

UTAH POWER AND LIGHT
600 W SOUTH TEMPLE
SALT LAKE CITY, UT 84104

Site 2 of 3 in cluster R

EDR MGP **1008409002**
N/A

Relative:
Higher

Actual:
4235 ft.

Manufactured Gas Plants:

Alternate Name:SALT LAKE CITY GAS CO; UTAH LIGHT AND RAILWAY CO;UNION LIGHT AND POWER CO. Years of Operation: 1871-1908

93
East
1/4-1/2
0.385 mi.
2033 ft.

MYERS CONTAINER CORP
49 SOUTH 600 WEST
SALT LAKE CITY, UT 84101

CORRACTS **1000369022**
RCRA NonGen / NLR **UTD035348325**

Relative:
Higher

Actual:
4235 ft.

CORRACTS:

EPA ID:	UTD035348325
EPA Region:	08
Area Name:	ENTIRE FACILITY
Actual Date:	20000901
Action:	CA225NR - Stabilization Measures Evaluation, This facility is, not amenable to stabilization activity at the, present time for reasons other than (1) it appears to be technically, infeasible or inappropriate (NF) or (2) there is a lack of technical, information (IN). Reasons for this conclusion may be the status of, closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other, administrative considerations
NAICS Code(s):	Not reported
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	UTD035348325
EPA Region:	08
Area Name:	ENTIRE FACILITY
Actual Date:	19970904
Action:	CA076LO
NAICS Code(s):	Not reported
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	UTD035348325
EPA Region:	08
Area Name:	ENTIRE FACILITY
Actual Date:	19970904
Action:	CA077LO
NAICS Code(s):	Not reported
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	UTD035348325
EPA Region:	08
Area Name:	ENTIRE FACILITY
Actual Date:	19970904
Action:	CA075LO - CA Prioritization, Facility or area was assigned a low corrective action priority
NAICS Code(s):	Not reported
Original schedule date:	Not reported

MYERS CONTAINER CORP (Continued) **1000369022**

Schedule end date: Not reported

EPA ID: UTD035348325
EPA Region: 08
Area Name: ENTIRE FACILITY
Actual Date: 19850315
Action: CA100 - RFI Imposition
NAICS Code(s): Not reported
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: UTD035348325
EPA Region: 08
Area Name: ENTIRE FACILITY
Actual Date: 19850515
Action: CA050 - RFA Completed
NAICS Code(s): Not reported
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: UTD035348325
EPA Region: 08
Area Name: ENTIRE FACILITY
Actual Date: 19960916
Action: CA750YE - Migration of Contaminated Groundwater under Control, Yes, Migration of Contaminated Groundwater Under Control has been verified
NAICS Code(s): Not reported
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: UTD035348325
EPA Region: 08
Area Name: ENTIRE FACILITY
Actual Date: 19960916
Action: CA725YE - Current Human Exposures Under Control, Yes, Current Human Exposures Under Control has been verified
NAICS Code(s): Not reported
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: UTD035348325
EPA Region: 08
Area Name: ENTIRE FACILITY
Actual Date: 19960916
Action: CA070NO - RFA Determination Of Need For An RFI, RFI is Not Necessary
NAICS Code(s): Not reported
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: UTD035348325
EPA Region: 08
Area Name: ENTIRE FACILITY
Actual Date: 19990824
Action: CA006OU
NAICS Code(s): Not reported
Original schedule date: Not reported
Schedule end date: Not reported

MYERS CONTAINER CORP (Continued) **1000369022**

RCRA NonGen / NLR:
Date form received by agency: 02/22/2007
Facility name: MYERS CONTAINER CORP
Facility address: 49 SOUTH 600 WEST
SALT LAKE CITY, UT 84101
EPA ID: UTD035348325
Mailing address: SOUTH 600 WEST
SALT LAKE CITY, UT 84101
Contact: JOHN MAUSSHARDT
Contact address: 49 SOUTH 600 WEST
SALT LAKE CITY, UT 84101
Contact country: US
Contact telephone: (801) 322-3529
Contact email: Not reported
EPA Region: 08
Land type: Private
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: MR. ED EISEM
Owner/operator address: 51 SOUTH 600 WEST
SALT LAKE CITY, UT 84101
Owner/operator country: Not reported
Owner/operator telephone: (801) 581-1905
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 02/25/1994
Site name: MYERS CONTAINER CORP. #1
Classification: Large Quantity Generator

Date form received by agency: 02/28/1992
Site name: MYERS CONTAINER CORP.
Classification: Large Quantity Generator

MYERS CONTAINER CORP (Continued) **1000369022**

Date form received by agency: 08/18/1980
Site name: MYERS CONTAINER CORP
Classification: Not a generator, verified

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D008
. Waste name: LEAD

. Waste code: F002
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE(BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Corrective Action Summary:
Event date: 03/15/1985
Event: RFI Imposition

Event date: 05/15/1985
Event: RFA Completed

Event date: 09/16/1996
Event: Igration of Contaminated Groundwater under Control, Yes, Migration of

MYERS CONTAINER CORP (Continued) **1000369022**

Contaminated Groundwater Under Control has been verified. Based on a review of information contained in the EI determination, it has been determined that migration of contaminated groundwater is under control at the facility. Specifically, this determination indicates that the migration of contaminated groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the existing area of contaminated groundwater. This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

Event date: 09/16/1996
Event: Current Human Exposures under Control, Yes, Current Human Exposures Under Control has been verified. Based on a review of information contained in the EI determination, current human exposures are expected to be under control at the facility under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

Event date: 09/16/1996
Event: RFA Determination Of Need For An RFI, RFI is Not Necessary;

Event date: 09/04/1997
Event: CA076LO

Event date: 09/04/1997
Event: CA Prioritization, Facility or area was assigned a low corrective action priority.

Event date: 09/04/1997
Event: CA077LO

Event date: 08/24/1999
Event: CA006OU

Event date: 09/01/2000
Event: Stabilization Measures Evaluation,This facility is not amenable to stabilization activity at the present time for reasons other than 1- it appears to be technically infeasible or inappropriate (NF) or 2- there is a lack of technical information (IN). Reasons for this conclusion may be the status of closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other administrative considerations.

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: LDR - General
Date violation determined: 11/05/1991
Date achieved compliance: 02/05/1993
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 02/05/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 18000

MYERS CONTAINER CORP (Continued) **1000369022**

Paid penalty amount: 18000

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 11/05/1991
Date achieved compliance: 02/05/1993
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 02/05/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 18000
Paid penalty amount: 18000

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 08/03/1990
Date achieved compliance: 08/13/1990
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/03/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 06/12/1984
Date achieved compliance: 03/15/1985
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 09/07/1984
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 06/12/1984
Date achieved compliance: 03/15/1985
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 09/07/1984
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

MYERS CONTAINER CORP (Continued) **1000369022**

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 06/12/1984
Date achieved compliance: 03/15/1985
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 03/15/1985
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 3500
Final penalty amount: 3500
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 11/05/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: LDR - General
Date achieved compliance: 02/05/1993
Evaluation lead agency: State

Evaluation date: 11/05/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 02/05/1993
Evaluation lead agency: State

Evaluation date: 08/03/1990
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Generators - General
Date achieved compliance: 08/13/1990
Evaluation lead agency: State

Evaluation date: 06/01/1990
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/20/1985
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/28/1985
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/03/1985
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

MYERS CONTAINER CORP (Continued) **1000369022**

Evaluation date: 05/06/1985
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/04/1985
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/12/1984
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 03/15/1985
Evaluation lead agency: State

R94 **DESERET PAINT** **CERC-NFRAP** **1003877301**
ENE **14 N. 600 W.** **UTD988066023**
1/4-1/2 **SALT LAKE CITY, UT 84116**
0.390 mi.
2061 ft. **Site 3 of 3 in cluster R**

Relative:
Higher

Actual:
4235 ft.

CERC-NFRAP:
Site ID: 0800005
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: NFRAP-Site does not qualify for the NPL based on existing information

CERCLIS-NFRAP Site Contact Details:
Contact Sequence ID: 13385214.00000
Person ID: 13002897.00000

CERCLIS-NFRAP Assessment History:
Action: PRELIMINARY ASSESSMENT
Date Started: / /
Date Completed: 04/14/89
Priority Level: Higher priority for further assessment

Action: ARCHIVE SITE
Date Started: / /
Date Completed: 09/23/92
Priority Level: Not reported

Action: SITE INSPECTION
Date Started: / /
Date Completed: 09/23/92
Priority Level: NFRAP-Site does not qualify for the NPL based on existing information

Action: DISCOVERY
Date Started: / /
Date Completed: 06/24/88
Priority Level: Not reported

95
WSW
1/4-1/2
0.411 mi.
2171 ft.

QUESTAR REGULATED SERVICES - SALT LAKE OPERATIONS
1175 W 130 S
SALT LAKE CITY, UT 84139

UT LUST U000559047
UT UST N/A

Relative:
Lower

Actual:
4226 ft.

LUST:

Facility ID:	4000625
Release Id:	MVO
Closed Date:	**09/28/2011**
Notification Date:	09/21/2011
Owner Name:	QUESTAR REGULATED SERVICES
Owner Address:	P O BOX 45360 M/S DNR 206
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84145
Owner City,St,Zip:	SALT LAKE CITY, UT 84145
Project Manager:	UST

Facility ID:	4000625
Release Id:	LZD
Closed Date:	**07/06/2005**
Notification Date:	07/06/2005
Owner Name:	QUESTAR REGULATED SERVICES
Owner Address:	P O BOX 45360 M/S DNR 206
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84145
Owner City,St,Zip:	SALT LAKE CITY, UT 84145
Project Manager:	UST

UST:

Facility ID:	4000625
Owner Name:	QUESTAR REGULATED SERVICES
Owner Address:	P O BOX 45360 M/S DNR 206
Owner City,St,Zip:	SALT LAKE CITY, UT 84145
Owner Phone:	(801) 558-7837
Total Tanks:	3
Closed Tanks:	3

S96
SE
1/4-1/2
0.425 mi.
2246 ft.

UTA - CENTRAL DIVISION
610 W 200 S
SALT LAKE CITY, UT 84104
Site 1 of 2 in cluster S

UT LUST U003149964
UT UST N/A
UT Financial Assurance

Relative:
Higher

Actual:
4233 ft.

LUST:

Facility ID:	4001132
Release Id:	FPD
Closed Date:	**01/03/1996**
Notification Date:	03/21/1990
Owner Name:	UTAH TRANSIT AUTHORITY
Owner Address:	PO BOX 30810
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84130
Owner City,St,Zip:	SALT LAKE CITY, UT 84130
Project Manager:	Mark Crim

UTA - CENTRAL DIVISION (Continued) **U003149964**

Facility ID: 4001132
Release Id: LIE
Closed Date: **02/04/2002**
Notification Date: 12/06/2000
Owner Name: UTAH TRANSIT AUTHORITY
Owner Address: PO BOX 30810
Owner City: SALT LAKE CITY
Owner State: UT
Owner Zip: 84130
Owner City,St,Zip: SALT LAKE CITY, UT 84130
Project Manager: Morgan Atkinson

Facility ID: 4001132
Release Id: LJP
Closed Date: **04/05/2010**
Notification Date: 04/04/2001
Owner Name: UTAH TRANSIT AUTHORITY
Owner Address: PO BOX 30810
Owner City: SALT LAKE CITY
Owner State: UT
Owner Zip: 84130
Owner City,St,Zip: SALT LAKE CITY, UT 84130
Project Manager: Morgan Atkinson

UST:
Facility ID: 4001132
Owner Name: UTAH TRANSIT AUTHORITY
Owner Address: PO BOX 30810
Owner City,St,Zip: SALT LAKE CITY, UT 84130
Owner Phone: (801) 287-3064
Total Tanks: 15
Closed Tanks: 8

UT Financial Assurance 2:
Region: 2
Facility ID: 4001132
Mechanism: Self-insurance

T97 **MARK STEEL** **UT LUST** **U000813286**
SSE **751 W 300 S** **UT UST** **N/A**
1/4-1/2 **SALT LAKE CITY, UT 84104**
0.440 mi.
2323 ft. **Site 1 of 3 in cluster T**

Relative:
Lower

Actual:
4229 ft.

LUST:
Facility ID: 4001878
Release Id: HYM
Closed Date: **04/26/1995**
Notification Date: 01/05/1993
Owner Name: MARK STEEL
Owner Address: 751 W 300 S
Owner City: SALT LAKE CITY
Owner State: UT
Owner Zip: 84104
Owner City,St,Zip: SALT LAKE CITY, UT 84104
Project Manager: [Evan Sullivan]

MARK STEEL (Continued) **U000813286**

UST:
Facility ID: 4001878
Owner Name: MARK STEEL
Owner Address: 751 W 300 S
Owner City,St,Zip: SALT LAKE CITY, UT 84104
Owner Phone: (801) 521-2670
Total Tanks: 3
Closed Tanks: 3

T98 **GENEVA ROCK PRODUCTS,INC.** **UT LUST** **U003150663**
SSE **748 W 300 S** **UT UST** **N/A**
1/4-1/2 **SALT LAKE CITY, UT 84104** **UT Financial Assurance**
0.441 mi.
2330 ft. **Site 2 of 3 in cluster T**

Relative:
Lower

Actual:
4229 ft.

LUST:
Facility ID: 4000412
Release Id: GHQ
Closed Date: **12/11/1997**
Notification Date: 11/26/1990
Owner Name: GENEVA ROCK PRODUCTS INC
Owner Address: 730 N 1500 W
Owner City: OREM
Owner State: UT
Owner Zip: 84057
Owner City,St,Zip: OREM, UT 84057
Project Manager: [Evan Sullivan]

Facility ID: 4000412
Release Id: LLX
Closed Date: **05/19/2003**
Notification Date: 11/16/2001
Owner Name: GENEVA ROCK PRODUCTS INC
Owner Address: 730 N 1500 W
Owner City: OREM
Owner State: UT
Owner Zip: 84057
Owner City,St,Zip: OREM, UT 84057
Project Manager: [DeAnn Rasmussen]

UST:
Facility ID: 4000412
Owner Name: GENEVA ROCK PRODUCTS INC
Owner Address: 730 N 1500 W
Owner City,St,Zip: OREM, UT 84057
Owner Phone: (801) 802-6954
Total Tanks: 5
Closed Tanks: 4

UT Financial Assurance 2:
Region: 2
Facility ID: 4000412
Mechanism: Self-insurance

T99
SSE
1/4-1/2
0.442 mi.
2336 ft.

NOYCE TRANSFER CO
736 W 300 S
SALT LAKE CITY, UT 84104

Site 3 of 3 in cluster T

UT LUST **U003149889**
UT UST **N/A**

Relative:
Lower

Actual:
4229 ft.

LUST:

Facility ID:	4000661
Release Id:	FYY
Closed Date:	**06/05/1995**
Notification Date:	08/01/1990
Owner Name:	WILLIAM L EMMEL
Owner Address:	1217 BRICKYARD RD #102
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84106
Owner City,St,Zip:	SALT LAKE CITY, UT 84106
Project Manager:	[Shelly Quick]

UST:

Facility ID:	4000661
Owner Name:	WILLIAM L EMMEL
Owner Address:	1217 BRICKYARD RD #102
Owner City,St,Zip:	SALT LAKE CITY, UT 84106
Owner Phone:	(801) 467-6304
Total Tanks:	1
Closed Tanks:	1

S100
ESE
1/4-1/2
0.445 mi.
2351 ft.

SALT LAKE CITY INTERMODAL HUB
600 WEST 200 SOUTH
SALT LAKE CITY, UT

Site 2 of 2 in cluster S

UT VCP **S105429897**
N/A

Relative:
Higher

Actual:
4233 ft.

VCP:

VCP Number:	VCP-C016
Site Acreage:	17.00
Project Manager:	KRISTEN (LEIGH) ANDERSON
Status:	COC/SMP
Date Of Application:	03/22/1999
Date Of Agreement:	04/29/1999
Date Of Completion:	02/02/2007
Date Of Termination:	Not reported
EPA Cerclis Archive Date:	Not reported

101
ENE
1/4-1/2
0.461 mi.
2433 ft.

AMERICAN BARREL COMPANY
600 WEST NORTH TEMPLE
SALT LAKE CITY, UT 84116

CORRACTS **1000360561**
RCRA-CESQG **UTD000818211**
ICIS
FINDS

Relative:
Higher

Actual:
4239 ft.

CORRACTS:

EPA ID:	UTD000818211
EPA Region:	08
Area Name:	ENTIRE FACILITY
Actual Date:	19971003

AMERICAN BARREL COMPANY (Continued) **1000360561**

Action:	CA225NR - Stabilization Measures Evaluation, This facility is, not amenable to stabilization activity at the, present time for reasons other than (1) it appears to be technically, infeasible or inappropriate (NF) or (2) there is a lack of technical, information (IN). Reasons for this conclusion may be the status of, closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other, administrative considerations
NAICS Code(s):	221112 Fossil Fuel Electric Power Generation
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	UTD000818211
EPA Region:	08
Area Name:	ENTIRE FACILITY
Actual Date:	19970904
Action:	CA075LO - CA Prioritization, Facility or area was assigned a low corrective action priority
NAICS Code(s):	221112 Fossil Fuel Electric Power Generation
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	UTD000818211
EPA Region:	08
Area Name:	ENTIRE FACILITY
Actual Date:	19960916
Action:	CA076LO
NAICS Code(s):	221112 Fossil Fuel Electric Power Generation
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	UTD000818211
EPA Region:	08
Area Name:	ENTIRE FACILITY
Actual Date:	19960916
Action:	CA750YE - Migration of Contaminated Groundwater under Control, Yes, Migration of Contaminated Groundwater Under Control has been verified
NAICS Code(s):	221112 Fossil Fuel Electric Power Generation
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID:	UTD000818211
EPA Region:	08
Area Name:	ENTIRE FACILITY
Actual Date:	19960916
Action:	CA210SF - CA Responsibility Referred To A Non-RCRA Federal Authority, Corrective Action at the facility or area referred to CERCLA
NAICS Code(s):	221112 Fossil Fuel Electric Power Generation
Original schedule date:	Not reported
Schedule end date:	Not reported

EPA ID: UTD000818211

AMERICAN BARREL COMPANY (Continued) **1000360561**

EPA Region: 08
Area Name: ENTIRE FACILITY
Actual Date: 19960916
Action: CA725YE - Current Human Exposures Under Control, Yes, Current Human Exposures Under Control has been verified
NAICS Code(s): 221112
Fossil Fuel Electric Power Generation
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: UTD000818211
EPA Region: 08
Area Name: ENTIRE FACILITY
Actual Date: 19960916
Action: CA070NO - RFA Determination Of Need For An RFI, RFI is Not Necessary
NAICS Code(s): 221112
Fossil Fuel Electric Power Generation
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: UTD000818211
EPA Region: 08
Area Name: ENTIRE FACILITY
Actual Date: 19960916
Action: CA050 - RFA Completed
NAICS Code(s): 221112
Fossil Fuel Electric Power Generation
Original schedule date: 19960916
Schedule end date: Not reported

EPA ID: UTD000818211
EPA Region: 08
Area Name: ENTIRE FACILITY
Actual Date: 19960916
Action: CA077LO
NAICS Code(s): 221112
Fossil Fuel Electric Power Generation
Original schedule date: Not reported
Schedule end date: Not reported

RCRA-CESQG:
Date form received by agency: 02/18/2010
Facility name: AMERICAN BARREL COMPANY
Facility address: 600 WEST NORTH TEMPLE
SALT LAKE CITY, UT 84116
EPA ID: UTD000818211
Mailing address: NORTH TEMPLE
SALT LAKE CITY, UT 84116
Contact: JEFF TUCKER
Contact address: WEST NORTH TEMPLE
SALT LAKE CITY, UT 84101
Contact country: US
Contact telephone: (801) 220-2989
Contact email: JEFF.TUCKER@PACIFICORP.COM
EPA Region: 08
Land type: Private
Classification: Conditionally Exempt Small Quantity Generator

AMERICAN BARREL COMPANY (Continued) **1000360561**

Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name:	PACIFICORP
Owner/operator address:	NORTH TEMPLE SALT LAKE CITY, UT 84116
Owner/operator country:	US
Owner/operator telephone:	(801) 220-2989
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	02/15/1988
Owner/Op end date:	Not reported

Owner/operator name:	PACIFICORP
Owner/operator address:	NORTH TEMPLE SALT LAKE CITY, UT 84116
Owner/operator country:	US
Owner/operator telephone:	(801) 220-2989
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	02/15/1987
Owner/Op end date:	Not reported

Owner/operator name:	EISEN EDWARD
Owner/operator address:	DATA NOT REQUESTED DATA NOT REQUESTED, UT 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(999) 999-9999
Legal status:	Not reported
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No

AMERICAN BARREL COMPANY (Continued) **1000360561**

Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 05/21/2007
Site name: AMERICAN BARREL COMPANY
Classification: Not a generator, verified

Date form received by agency: 08/18/1980
Site name: AMERICAN BARREL COMPANY
Classification: Not a generator, verified

. Waste code: F002
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F004
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: CRESOLS, CRESYLIC ACID, AND NITROBENZENE; AND THE STILL BOTTOMS FROM THE RECOVERY OF THESE SOLVENTS; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OFONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE(BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

AMERICAN BARREL COMPANY (Continued) **1000360561**

. Waste code: K049
. Waste name: SLOP OIL EMULSION SOLIDS FROM THE PETROLEUM REFINING INDUSTRY.

. Waste code: U002
. Waste name: 2-PROPANONE (I) (OR) ACETONE (I)

. Waste code: U019
. Waste name: BENZENE (I,T)

. Waste code: U112
. Waste name: ACETIC ACID, ETHYL ESTER (I) (OR) ETHYL ACETATE (I)

. Waste code: U159
. Waste name: 2-BUTANONE (I,T) (OR) METHYL ETHYL KETONE (MEK) (I,T)

. Waste code: U220
. Waste name: BENZENE, METHYL- (OR) TOLUENE

Corrective Action Summary:

Event date: 09/16/1996
Event: RFA Completed

Event date: 09/16/1996
Event: RFA Determination Of Need For An RFI, RFI is Not Necessary;

Event date: 09/16/1996
Event: CA Responsibility Referred To A Non-RCRA Federal Authority, Corrective Action at the facility or area referred to CERCLA.

Event date: 09/16/1996
Event: CA077LO

Event date: 09/16/1996
Event: Current Human Exposures under Control, Yes, Current Human Exposures Under Control has been verified. Based on a review of information contained in the EI determination, current human exposures are expected to be under control at the facility under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

Event date: 09/16/1996
Event: Igration of Contaminated Groundwater under Control, Yes, Migration of Contaminated Groundwater Under Control has been verified. Based on a review of information contained in the EI determination, it has been determined that migration of contaminated groundwater is under control at the facility. Specifically, this determination indicates that the migration of contaminated groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the existing area of contaminated groundwater. This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

Event date: 09/16/1996
Event: CA076LO

Event date: 09/04/1997

AMERICAN BARREL COMPANY (Continued) **1000360561**

Event: CA Prioritization, Facility or area was assigned a low corrective action priority.

Event date: 10/03/1997
Event: Stabilization Measures Evaluation,This facility is not amenable to stabilization activity at the present time for reasons other than 1- it appears to be technically infeasible or inappropriate (NF) or 2- there is a lack of technical information (IN). Reasons for this conclusion may be the status of closure at the facility, the degree of risk, timing considerations, the status of corrective action work at the facility, or other administrative considerations.

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 08/01/1986
Date achieved compliance: 08/01/1987
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 05/27/1986
Date achieved compliance: 05/27/1987
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 05/17/2007
Evaluation: COMPLIANCE ASSISTANCE VISIT
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/08/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/09/1990
Evaluation: NON-FINANCIAL RECORD REVIEW

AMERICAN BARREL COMPANY (Continued) **1000360561**

Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

Evaluation date: 08/01/1986
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 08/01/1987
Evaluation lead agency: State

Evaluation date: 05/27/1986
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 05/27/1987
Evaluation lead agency: State

ICIS:
Enforcement Action ID: 08-1988-0066
FRS ID: 110000619947
Program ID: RCRAINFO UTD000818211
Action Name: UTAH POWER & LIGHT
Full Address: 600 WEST NORTH TEMPLE SALT LAKE CITY UT 84116
State: Utah
Facility Name: AMERICAN BARREL COMPANY
Facility Address: 600 WEST NORTH TEMPLE
SALT LAKE CITY, UT 84116
Enforcement Action Type: CERCLA 106 AO For Resp Action/Imm Haz
Facility County: SALT LAKE
EPA Region #: 8

Enforcement Action ID: 08-1988-0066
FRS ID: 110000619947
Program ID: FRS 110000619947
Action Name: UTAH POWER & LIGHT
Full Address: 600 WEST NORTH TEMPLE SALT LAKE CITY UT 84116
State: Utah
Facility Name: AMERICAN BARREL COMPANY
Facility Address: 600 WEST NORTH TEMPLE
SALT LAKE CITY, UT 84116
Enforcement Action Type: CERCLA 106 AO For Resp Action/Imm Haz
Facility County: SALT LAKE
EPA Region #: 8

Program ID: FRS 110000619947
Facility Name: AMERICAN BARREL COMPANY
Address: 600 WEST NORTH TEMPLE
Tribal Indicator: N
Fed Facility: No
NAIC Code: Not reported
SIC Code: Not reported

Program ID: RCRAINFO UTD000818211
Facility Name: AMERICAN BARREL COMPANY
Address: 600 WEST NORTH TEMPLE
Tribal Indicator: N
Fed Facility: No
NAIC Code: Not reported

AMERICAN BARREL COMPANY (Continued) **1000360561**

SIC Code: Not reported

FINDS:

Registry ID: 110031319927

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Registry ID: 110000619947

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

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102 NNW 1/4-1/2 0.469 mi. 2477 ft. **S.L.C. FIRE DEPT. STATION #7** **UT LUST U003150403**
273 N 1000 W **UT UST N/A**
SALT LAKE CITY, UT 84116

Relative: Lower

Actual: 4224 ft.

LUST:

Facility ID:	4000856
Release Id:	FOZ
Closed Date:	**12/27/1995**
Notification Date:	03/15/1990
Owner Name:	SALT LAKE CITY FLEET MANAGEMENT
Owner Address:	1990 W 500 S
Owner City:	SALT LAKE CITY
Owner State:	UT
Owner Zip:	84104
Owner City,St,Zip:	SALT LAKE CITY, UT 84104

S.L.C. FIRE DEPT. STATION #7 (Continued) **U003150403**

Project Manager: [Mike Pfeiffer]

UST:
Facility ID: 4000856
Owner Name: SALT LAKE CITY FLEET MANAGEMENT
Owner Address: 1990 W 500 S
Owner City,St,Zip: SALT LAKE CITY, UT 84104
Owner Phone: (801) 535-6904
Total Tanks: 3
Closed Tanks: 3

Count: 6 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
SALT LAKE CITY	1015737026	BP PRODUCTS NO. AMERICA INC. SLC,	1700 NORTH 1200 WEST	84103	RCRA-TSDF, CERC-NFRAP, CORRA(RCRA NonGen / NLR, FINDS, US FIN ASSUR, 2020 COR ACTION
SALT LAKE CITY	1003877403	OLD SALT LAKE CITY FIRE STATION	2ND WEST 7TH SOUTH	84101	CERC-NFRAP
SALT LAKE CITY	1009463065	BULLOUGH ASBESTOS	800 WEST 50 SOUTH	84104	CERC-NFRAP
SALT LAKE CITY	1003877567	AMOCO REFINERY LEADED SLUDGE STORA	1280 N 800 W	84103	CERC-NFRAP
SALT LAKE CITY	1003877829	STANDARD SMELTING AND REFINING COM	CORNER OF DUPONT AVE. AND CARO	84116	CERC-NFRAP
SALT LAKE CITY	1003877825	JENNINGS AND PASCOE SMELTER	STATE RD 89 (BECK STREET) & 80	84116	CERC-NFRAP, LEAD SMELTERS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 12/16/2014
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 32

Source: EPA
Telephone: N/A
Last EDR Contact: 04/08/2015
Next Scheduled EDR Contact: 07/20/2015
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 12/16/2014
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 32

Source: EPA
Telephone: N/A
Last EDR Contact: 04/08/2015
Next Scheduled EDR Contact: 07/20/2015
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 12/16/2014
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 32

Source: EPA
Telephone: N/A
Last EDR Contact: 04/08/2015
Next Scheduled EDR Contact: 07/20/2015
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 04/02/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 07/21/2014
Date Data Arrived at EDR: 10/07/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/08/2015
Next Scheduled EDR Contact: 07/20/2015
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 04/02/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 03/31/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 03/31/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 03/31/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 03/31/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 03/31/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 09/18/2014
Date Data Arrived at EDR: 09/19/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/26/2015
Next Scheduled EDR Contact: 06/15/2015
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 09/18/2014
Date Data Arrived at EDR: 09/19/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/26/2015
Next Scheduled EDR Contact: 06/15/2015
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/03/2014
Date Data Arrived at EDR: 12/12/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 48

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/16/2015
Next Scheduled EDR Contact: 06/01/2015
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 09/30/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 37

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 03/31/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: Department of Environmental Quality
Telephone: 801-536-4100
Last EDR Contact: 02/02/2015
Next Scheduled EDR Contact: 05/18/2015
Data Release Frequency: N/A

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: List of Landfills

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 06/01/2014
Date Data Arrived at EDR: 07/16/2014
Date Made Active in Reports: 08/08/2014
Number of Days to Update: 23

Source: Department of Environmental Quality
Telephone: 801-538-6170
Last EDR Contact: 04/13/2015
Next Scheduled EDR Contact: 07/27/2015
Data Release Frequency: Semi-Annually

State and tribal leaking storage tank lists

LUST: Sites with Leaking Underground Storage Tanks

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 01/20/2015
Date Data Arrived at EDR: 01/20/2015
Date Made Active in Reports: 02/24/2015
Number of Days to Update: 35

Source: Department of Environmental Quality
Telephone: 801-536-4115
Last EDR Contact: 04/21/2015
Next Scheduled EDR Contact: 08/03/2015
Data Release Frequency: Quarterly

LAST: Leaking Aboveground Storage Tank Sites

A listing of leaking aboveground storage tank locations.

Date of Government Version: 03/11/2015
Date Data Arrived at EDR: 03/12/2015
Date Made Active in Reports: 03/20/2015
Number of Days to Update: 8

Source: Department of Environmental Quality
Telephone: 801-536-4141
Last EDR Contact: 03/09/2015
Next Scheduled EDR Contact: 06/22/2015
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 02/03/2015
Date Data Arrived at EDR: 02/12/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 29

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 09/23/2014
Date Data Arrived at EDR: 11/25/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 65

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/08/2015
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/08/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Quarterly

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 01/28/2015
Date Data Arrived at EDR: 01/30/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 42
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 184
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/03/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 09/30/2014
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 10
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Semi-Annually

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 01/23/2015
Date Data Arrived at EDR: 02/10/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 31
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 01/30/2015
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 32
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Varies

State and tribal registered storage tank lists

UST: List of Sites with Underground Storage Tanks
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 01/20/2015
Date Data Arrived at EDR: 01/20/2015
Date Made Active in Reports: 02/24/2015
Number of Days to Update: 35
Source: Department of Environmental Quality
Telephone: 801-536-4115
Last EDR Contact: 04/21/2015
Next Scheduled EDR Contact: 08/03/2015
Data Release Frequency: Quarterly

AST: Listing of Aboveground Storage Tanks
Aboveground storage tank site locations.

Date of Government Version: 03/11/2015
Date Data Arrived at EDR: 03/12/2015
Date Made Active in Reports: 03/20/2015
Number of Days to Update: 8

Source: Department of Environmental Quality
Telephone: 801-536-4100
Last EDR Contact: 03/06/2015
Next Scheduled EDR Contact: 06/22/2015
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 01/27/2014
Number of Days to Update: 271

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/28/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 09/30/2014
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 10

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 01/30/2015
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 36

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 01/23/2015
Date Data Arrived at EDR: 02/13/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 28

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/23/2014
Date Data Arrived at EDR: 11/25/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 65

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 12/14/2014
Date Data Arrived at EDR: 02/13/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 28

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 02/03/2015
Date Data Arrived at EDR: 02/12/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 29

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 01/29/2015
Date Data Arrived at EDR: 01/30/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 42

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Quarterly

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/13/2015
Next Scheduled EDR Contact: 07/27/2015
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: Sites with Institutional Controls

Sites included on the Brownfields Sites listing that have institutional controls in place.

Date of Government Version: 02/02/2015
Date Data Arrived at EDR: 02/04/2015
Date Made Active in Reports: 02/24/2015
Number of Days to Update: 20

Source: Department of Environmental Quality
Telephone: 801-536-4100
Last EDR Contact: 02/04/2015
Next Scheduled EDR Contact: 05/18/2015
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 10/01/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 36

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 04/02/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Varies

VCP: Voluntary Cleanup Sites List

The purpose of the program is to encourage the voluntary cleanup of sites where there has been a contaminant release threatening public health and the environment, thereby removing the stigma attached to these sites which blocks economic redevelopment. Voluntary cleanup of these sites will hopefully result in clearing the pathway for returning these properties to beneficial use.

Date of Government Version: 02/20/2015
Date Data Arrived at EDR: 02/24/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 17

Source: Department of Environmental Quality
Telephone: 801-536-4100
Last EDR Contact: 02/16/2015
Next Scheduled EDR Contact: 06/01/2015
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Assessment Sites

A Brownfields site means real property, the expansion, redevelopment or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant, controlled substance or petroleum product.

Date of Government Version: 02/06/2015
Date Data Arrived at EDR: 02/20/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 21

Source: Department of Environmental Quality
Telephone: 801-536-4100
Last EDR Contact: 02/16/2015
Next Scheduled EDR Contact: 06/01/2015
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 12/22/2014
Date Data Arrived at EDR: 12/22/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 38

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/24/2015
Next Scheduled EDR Contact: 07/06/2015
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 04/23/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 02/02/2015
Next Scheduled EDR Contact: 05/18/2015
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/25/2015
Date Data Arrived at EDR: 03/10/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 15
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/03/2015
Next Scheduled EDR Contact: 06/15/2015
Data Release Frequency: Quarterly

CDL: Methamphetamine Contaminated Properties Listing
Utah Administrative Rule 19-6-901 Illegal Drug Operations Site Reporting and Decontamination Act requires local health departments to maintain a list of properties believed to be contaminated by the illegal manufacture of drugs. The following properties were reported to the Salt Lake Valley Health Department by a complaint or report from a law enforcement agency and the Department has determined that reasonable evidence exists that the property is contaminated.

Date of Government Version: 02/23/2015
Date Data Arrived at EDR: 02/25/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 16
Source: Salt Lake Valley Health Department
Telephone: 801-468-2750
Last EDR Contact: 02/25/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/25/2015
Date Data Arrived at EDR: 03/10/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 15
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/03/2015
Next Scheduled EDR Contact: 06/15/2015
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/29/2014
Date Data Arrived at EDR: 12/30/2014
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 69

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 03/31/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Annually

SPILLS: Spills Data

Incidents reported to the Division of Environmental Response and Remediation

Date of Government Version: 04/23/2013
Date Data Arrived at EDR: 04/23/2013
Date Made Active in Reports: 06/13/2013
Number of Days to Update: 51

Source: Department of Environmental Quality
Telephone: 801-536-4100
Last EDR Contact: 04/17/2015
Next Scheduled EDR Contact: 08/03/2015
Data Release Frequency: Semi-Annually

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 07/31/2011
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/11/2013
Number of Days to Update: 39

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 03/31/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 02/03/2015
Next Scheduled EDR Contact: 05/18/2015
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/14/2015
Next Scheduled EDR Contact: 07/27/2015
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 06/06/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 8

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 03/13/2015
Next Scheduled EDR Contact: 06/22/2015
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 01/23/2015
Date Data Arrived at EDR: 02/13/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 24

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 03/30/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 03/10/2015
Next Scheduled EDR Contact: 06/22/2015
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 02/27/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 12/30/2014
Date Data Arrived at EDR: 12/31/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 29

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 03/06/2015
Next Scheduled EDR Contact: 06/15/2015
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/31/2013
Date Made Active in Reports: 09/13/2013
Number of Days to Update: 44

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 01/29/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/15/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 14

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/27/2015
Next Scheduled EDR Contact: 07/06/2015
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 02/23/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 02/23/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 04/10/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/23/2015
Date Data Arrived at EDR: 02/06/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 04/09/2015
Next Scheduled EDR Contact: 07/27/2015
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 10/15/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 33

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/17/2015
Next Scheduled EDR Contact: 07/27/2015
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 12/29/2014
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 21

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 03/09/2015
Next Scheduled EDR Contact: 06/22/2015
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 02/27/2015
Date Data Arrived at EDR: 02/27/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 26

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/09/2015
Next Scheduled EDR Contact: 07/20/2015
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 01/18/2015
Date Data Arrived at EDR: 02/27/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 26

Source: EPA
Telephone: (303) 312-6312
Last EDR Contact: 03/09/2015
Next Scheduled EDR Contact: 06/22/2015
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 02/01/2015
Date Data Arrived at EDR: 02/13/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 04/27/2015
Next Scheduled EDR Contact: 08/10/2015
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/19/2013
Number of Days to Update: 52

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 02/24/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Biennially

UIC: UIC Site Location Listing
A listing of underground injection control wells.

Date of Government Version: 03/03/2015
Date Data Arrived at EDR: 03/05/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 8

Source: Department of Natural Resources
Telephone: 801-538-5329
Last EDR Contact: 03/05/2015
Next Scheduled EDR Contact: 06/15/2015
Data Release Frequency: Quarterly

DRYCLEANERS: Registered Drycleaners
A listing of registered drycleaners.

Date of Government Version: 01/20/2015
Date Data Arrived at EDR: 01/21/2015
Date Made Active in Reports: 02/24/2015
Number of Days to Update: 34

Source: Department of Environmental Quality
Telephone: 801-536-4437
Last EDR Contact: 04/16/2015
Next Scheduled EDR Contact: 08/03/2015
Data Release Frequency: Varies

NPDES: Permitted Facilities Listing
A listing of Division of Water Quality permits.

Date of Government Version: 03/30/2015
Date Data Arrived at EDR: 04/07/2015
Date Made Active in Reports: 04/30/2015
Number of Days to Update: 23

Source: Department of Environmental Quality
Telephone: 801-538-6146
Last EDR Contact: 03/13/2015
Next Scheduled EDR Contact: 06/29/2015
Data Release Frequency: Varies

TIER 2: Tier 2 Facility Listing
TIER 2 contains locations of Tier II facilities under the Emergency Planning and Community Right-to-Know Act (EPCRA). Qualifying facilities report on hazardous and toxic chemicals and are labeled either tier I or tier II. Locations are based on coordinates derived from maps and GPS data. These locations represent sites, not contaminated areas.

Date of Government Version: 05/15/2013
Date Data Arrived at EDR: 12/26/2013
Date Made Active in Reports: 01/31/2014
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 801-536-4152
Last EDR Contact: 03/27/2015
Next Scheduled EDR Contact: 07/06/2015
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/14/2015
Next Scheduled EDR Contact: 07/27/2015
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 02/18/2015
Next Scheduled EDR Contact: 06/01/2015
Data Release Frequency: Varies

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 02/13/2015
Next Scheduled EDR Contact: 05/25/2015
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 11/25/2014
Date Data Arrived at EDR: 11/26/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 64

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 04/10/2015
Next Scheduled EDR Contact: 07/20/2015
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 02/13/2015
Next Scheduled EDR Contact: 05/25/2015
Data Release Frequency: Quarterly

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/14/2015
Next Scheduled EDR Contact: 07/27/2015
Data Release Frequency: N/A

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)
The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/16/2014
Date Data Arrived at EDR: 10/31/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 17
Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 03/30/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data
A listing of minor source facilities.

Date of Government Version: 10/16/2014
Date Data Arrived at EDR: 10/31/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 17
Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 03/30/2015
Next Scheduled EDR Contact: 07/13/2015
Data Release Frequency: Annually

US FIN ASSUR: Financial Assurance Information
All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 03/09/2015
Date Data Arrived at EDR: 03/10/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 15
Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 02/16/2015
Next Scheduled EDR Contact: 06/01/2015
Data Release Frequency: Quarterly

Financial Assurance 2: Financial Assurance Information Listing
Financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay

Date of Government Version: 12/10/2014
Date Data Arrived at EDR: 12/11/2014
Date Made Active in Reports: 01/21/2015
Number of Days to Update: 41
Source: Department of Environmental Quality
Telephone: 801-536-4141
Last EDR Contact: 03/09/2015
Next Scheduled EDR Contact: 06/22/2015
Data Release Frequency: Varies

FUDS: Formerly Used Defense Sites
Formerly used defense sites.

Date of Government Version: 05/15/2013
Date Data Arrived at EDR: 08/02/2013
Date Made Active in Reports: 09/13/2013
Number of Days to Update: 42
Source: Utah AGRC
Telephone: 801-538-3665
Last EDR Contact: 01/30/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 01/30/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 03/13/2015
Next Scheduled EDR Contact: 06/22/2015
Data Release Frequency: Varies

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 04/15/2015
Next Scheduled EDR Contact: 07/27/2015
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 01/27/2015
Date Data Arrived at EDR: 01/28/2015
Date Made Active in Reports: 02/24/2015
Number of Days to Update: 27

Source: Department of Environmental Quality
Telephone: 801-538-6794
Last EDR Contact: 04/13/2015
Next Scheduled EDR Contact: 07/27/2015
Data Release Frequency: Varies

EWA: Enforceable Written Assurances

EWA contains locations of potential Enforceable Written Assurance sites. EWAs will generally ensure to property owners or prospective property owners that there is no unacceptable risk to human health or the environment. EWA locations are based on coordinates derived from maps and GPS data. These locations represent sites, not contaminated areas.

Date of Government Version: 05/15/2013
Date Data Arrived at EDR: 12/26/2013
Date Made Active in Reports: 01/31/2014
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 801-536-4167
Last EDR Contact: 03/27/2015
Next Scheduled EDR Contact: 07/06/2015
Data Release Frequency: Varies

UOPF: Used Oil Permitted Facilities

DSHW Permitted Used Oil Facilities contains locations in Utah of all Used Oil Facilities: Marketers, Porcessoors, Transfer, Transport and Off-specification Permitted by UDEQ Division of Hazardous Waste (DSHW) ? Used Oil Section.

Date of Government Version: 05/15/2013
Date Data Arrived at EDR: 12/26/2013
Date Made Active in Reports: 01/31/2014
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 801-538-9408
Last EDR Contact: 03/27/2015
Next Scheduled EDR Contact: 07/06/2015
Data Release Frequency: Varies

MMRP: Military Munitions Response Program

Environment.MMRP contains locations of Military Munitions Response Program sites. MMRP manages the environmental, health and safety issues presented by unexploded ordnances (UXO), discarded military munitions (DMM) and munitions constituents (MC). Locations are based on coordinates derived from maps and GPS data. These locations represent sites, not contaminated areas.

Date of Government Version: 05/15/2013
Date Data Arrived at EDR: 12/26/2013
Date Made Active in Reports: 01/31/2014
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 801-539-4164
Last EDR Contact: 03/27/2015
Next Scheduled EDR Contact: 07/06/2015
Data Release Frequency: Varies

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 02/09/2015
Next Scheduled EDR Contact: 05/25/2015
Data Release Frequency: Quarterly

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR US Hist Auto Stat: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Quality in Utah.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/16/2014
Number of Days to Update: 199

Source: Department of Environmental Quality
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Quality in Utah.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/03/2014
Number of Days to Update: 186

Source: Department of Environmental Quality
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 01/01/2015
Date Data Arrived at EDR: 02/04/2015
Date Made Active in Reports: 02/27/2015
Number of Days to Update: 23

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 02/04/2015
Next Scheduled EDR Contact: 05/18/2015
Data Release Frequency: Annually

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 07/21/2014
Date Made Active in Reports: 08/25/2014
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 04/16/2015
Next Scheduled EDR Contact: 08/03/2015
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 03/19/2015
Date Made Active in Reports: 04/07/2015
Number of Days to Update: 19

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 03/13/2015
Next Scheduled EDR Contact: 06/29/2015
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Provider List
Source: Department of Health
Telephone: 801-538-9299

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands in Utah
Source: Automated Geographic Reference Center
Telephone: 801-537-9201

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

STREET AND ADDRESS INFORMATION

SQG/CESQG
COMPLIANCE EVALUATION INSPECTION

2014-011987

Date of Inspection:	August 27, 2014
Facility:	Schovaers Electronics Corp.
Facility Address:	22 Jeremy Street, Salt Lake City Utah 84104
County:	Salt Lake
EPA ID #	UTD085325769
Latitude / Longitude:	40.768652-111.915774
Generator Status:	SQG
Number of Employees:	5
Arrival / Departure Time:	11:30 a.m. to 12:30 p.m.
Weather Conditions:	Sunny, 70°F
Report Prepared By:	
Names of Inspectors:	Alex Pashley
Local Health Department Notification:	Salt Lake County Health Department, Notified was by e-mail on August 26, 2014.
Facility Notification / Date:	Unannounced
Applicable Rules:	**R315:** R315-5, R315-13, R315-16 and R315-9 of the Utah Administrative Code

CREDENTIALS

On August 27, 2014 the inspection team (team) met with and presented credentials to Bob Schovaers.

PURPOSE AND SCOPE

The purpose of this Compliance Evaluation Inspection (CEI) was to evaluate the Facility's waste management practices for compliance with R315 of the Utah Administrative Code (the Rules), Utah Solid and Hazardous Waste Act 19-6-101.

FACILITY DESCRIPTION AND WASTE MANAGEMENT OPERATIONS

Schovaers Electronics Corp. (Schovaers) is a circuit board plater and manufacture. Schovaers generates about 166 lbs. of waste water treatment filter press sludge cake (FOO6) per month, which is CESQG amounts. The filter press cake contains some lead (D008). Schovaers tries to completely fill a marino bag, before it is sent off for disposal, because it costs $300 dollars whether the marino bag is full or not. The problem is that a full marino bag of filter press sludge may weight more than the allowed 2,200lbs allowed under the CESQG rules, therefore Schovaers has decided to stay in the SQG category. Before placing the filter press cake into the marino bag, it is accumulated in 55-gallon drums. The drums were properly labeled and closed, however one of the drums was in very poor condition and had a corrosion hole in it (see pic). The filter press cake was dried, and was not leaking from the drum. Mr. Schovaer was told that all four drums needed to be replaced immediately. He indicated that he had four poly drums in back that he would start using.

All SQG required records and plans were in place and in good order. No problems were noted.

COMPLIANCE STATUS:

R315-5	**Hazardous Waste Generator Requirements**	
5-1.11	Determination of Whether a Waste is a Hazardous Waste	OK
5-1.12	EPA Identification Numbers UTD085325769	
5-2.20	Manifest OK	
5-3.30-3.33	Packaging, Labeling, Marking, and Placarding OK	
5.3.34	Accumulation Time OK	
	Container Management OK	
	Tank Management OK	
	Preparedness and Prevention OK	
5-4.40	Recordkeeping OK	
5-4.41	Biennial Reporting OK	

5-4.42 Exception Reporting N/A

5-4.43.1 Additional Reporting N/A

R315-13-1 Land Disposal Restrictions

13-1 Land Disposal Restrictions OK

R315-16 Standards for Universal Waste

R315-9 Spill Response

FOLLOW-UP ACTIONS:

Inspector Signature: Alf Pashley September 2, 2014
Date

ATTACHMENTS:

1. Photos
2. SQG Checklist

SQG Evaluation Form

Utah Department of Environmental Quality
Division of Solid and Hazardous Waste
P.O. Box 144880
Salt Lake City, Utah 84114-4880
Phone (801) 536-0200
Fax (801) 536-0222

SMALL BUSINESS ASSISTANCE PROGRAM
FACILITY INFORMATION FORM

Facility Name: Schovaers Electronics Corp		**EPA ID Number:** UTD085325769	
Street Address: 22 Jeremy Street		**City:** Salt Lake	**Zip:** 84104
County: SL	**Contact Person:** Bob Schovers	**Telephone #:** 801-521-2668	
Generator Status: SQG	**Number of Employees:** 5	**Date of Visit:** 8-27-2014	
Evaluators: Alex Pashley			
Other Personnel:			

Waste Stream/Generation Process	Estimated Generation Rate Per Month	Hazardous Waste Code
Plating Filter Cake.	166lbs/month.	F006 D008
Estimated Quantity of Hazardous Waste Generated Per Month		

Date: 8-27-2014

RECEIVED BY:
Name: (Printed) BOB SCHOVAERS
Signature: Bob Schovaers
Title: PRESIDENT

DSHW REPRESENTATIVE:
Name: (Printed) Alex Pashley
Signature: Alex Pashley
Title:

notified as a SQG but only generate CESQG amounts.

APPENDIX E
CREDENTIALS

ASHLEY SCOTHERN
ENVIRONMENTAL SCIENTIST

PROFESSIONAL EXPERIENCE

Ms. Scothern has seven years of experience working exclusively in conducting ASTM-compliant Phase I Environmental Site Assessment (ESAs). She has completed well over 200 environmental assessments for a variety of entities, including the transportation industry, municipal, state and federal government agencies, and financial institutions. Ms. Scothern has assessed a broad range of properties from large acreage summer camps, agricultural field properties, and large tracts of undeveloped land located along railroads to more complicated sites, such as salvage and recycling yards; a former coal loading facility; a small municipal airport, industrial facilities; multi-tenant strip mall properties, and investigations conducted on and near former smelters and within rail yards in locations throughout the western US.

PROJECT EXPERIENCE

JP Morgan Chase – Bloom Recyclers, Ogden, Utah

Ms. Scothern conducted an investigation on a large metal recycling facility in Ogden, Utah. The investigation focused on a facility that recycled iron, metal, vehicles, and copper. Issues evaluated at the site included impacts to soils at the site due to poor surface coverage of soils in the vehicle crushing area, an unlined stormwater pond located next to the car crushing area, poor chemical storage, and leaking hydraulic equipment, such as bailers and other facility related equipment. As part of the investigation process, several governmental entities were contacted; aerial, city directory, and Sanborn maps were reviewed for historical purposes; and a regulatory review was performed. A limited subsurface investigation was recommended to sample soils in the area of the stormwater pond, near the oil/water separator located in the vehicle crushing area, in the area of a leaking hydraulic bailer, and leaking vehicle parts storage area.

School Institutional Trust Lands Administration – Undeveloped Parcels Totaling 2,550 Acres, Green River, Utah

Ms. Scothern was the environmental assessor for the investigation of approximately 2,550 acres of undeveloped property located west of Green River. The property was divided into eight large tracts of land, two of which were accessible for inspection by vehicle. The remaining parcels had to be assessed by foot. Ms. Scothern worked closely with SITLA during this inspection to properly identify the property during inspection. Some areas were located down deep ravines and therefore were not accessed by foot. Due to the vast amount of land, the scrutiny of historical aerial coverage and topographic map coverage was essential. Ms. Scothern also worked with the Utah Oil, Gas, and Mining Division to identify any mining activities on the subject property.

Education
B.S., Environmental Studies, University of Utah, 2006

Certifications
AHERA: Building Inspector

OSHA 40-hour Hazwoper

Supplemental Education
Environmental Due Diligence – Principles & Practice; EPA Method 9 Visible Emissions Evaluation; OSHA Lead & Construction

Work History
Terracon Consultants, Inc., Environmental Scientist, September 1, 2012-Present

IHI Environmental, Inc., Environmental Assessor, 2008-2012

Nova Environmental, Project Manager, 2007

Terracon

Utah Reclamation Mitigation and Conservation Commission – Hadden Property, Myton, Utah
Ms. Scothern was the environmental assessor for the investigation of 140 acres of undeveloped property. Ms. Scothern contacted and inspected the property with a representative of the Ute Indian Tribe. The property consisted of two non-contiguous parcels, which were transected by the Duchesne River. ATVs were used to inspect a majority of the site, which also meant crossing the river to access the west parcel. The majority of the east parcel was traversed by foot. The inspection focused on flood areas by the river and those areas not easily viewable by historical aerial photography. As the subject property was tribal land, few regulatory records were available from the tribe; however, historical information gained through interviews was invaluable. This project was a unique opportunity in which Ms. Scothern worked with the Utah Commission on Reclamation Mitigation and Conservation and the Ute Indian Tribe. This Phase I ESA was conducted to preserve the open space and wetlands of the area.

Emery Refining, LLC – Former Atlas Dirty Devil Mining and Coal-loading Facility and Surrounding Undeveloped Property, Green River, Utah
Ms. Scothern was the environmental assessor for the investigation of a former coal-loading facility in Green River, Utah. This site included investigation of a 40-acre facility that stored and loaded coal onto rail cars. The remainder of the project also evaluated 480 undeveloped acres. Coal was still present at the time of inspection, as well as piles of coal ash from a combustion fire. The undeveloped portion of property was traversed by vehicle, following unpaved roads and visually assessing areas of the property that was visible from existing roads. Historical aerial photographs, railroad maps, the County's historical department, and the property owner's knowledge were essential in identifying potential fueling areas for the trains. As specified by the ASTM Standard E 2247-02 regarding large tracts of forestland or rural land, all the areas of the property need not be visually observed, emphasizing the special attention in gathering historical information on past use.

Utah Reclamation Mitigation and Conservation Commission – Hadden Property, Myton, Utah
Ms. Scothern was the environmental assessor for the investigation of 140 acres of undeveloped property. Ms. Scothern contacted and inspected the property with a representative of the Ute Indian Tribe. The property consisted of two non-contiguous parcels, which were transected by the Duchesne River. ATVs were used to inspect a majority of the site, which also meant crossing the river to access the west parcel. The majority of the east parcel was traversed by foot. The inspection focused on flood areas by the river and those areas not easily viewable by historical aerial photography. As the subject property was tribal land, few regulatory records were available from the tribe; however, historical information gained through interviews was invaluable. This project was a unique opportunity in which Ms. Scothern worked with the Utah Commission on Reclamation Mitigation and Conservation and the Ute Indian Tribe. This Phase I ESA was conducted to preserve the open space and wetlands of the area.

Summit Land Conservancy – Osguthorpe Round Valley Ranch, Park City, Utah
Ms. Scothern conducted an investigation on an approximately 120-acre ranch. Approximately half of the property, which was a cultivated agricultural farm, was inspected from boundary areas. A steep incline, snow cover, and gated areas, limited inspection of the western area of the subject property. Historical aerials and interviews with local and government agencies to verify past uses of the property were employed. Through regulatory research of the surrounding area, it was concluded that three large NPL sites from historical mining in the area adjoined or were in near proximity of the subject property. These sites are vast tracts of land, which included impacted waterways, as well as surface and subsurface contamination. The subject property was also determined to fall within Park City Soil Ordinance boundaries with land-use restrictions. Due to the close proximity of these historical mining sites in relation to the subject property, subsurface sampling was recommended to investigate if soils and groundwater at the site had been impacted. This assessment was also completed for open space land designation.

NAI Real Estate c/o the Church of Jesus Christ of Latter-day Saints – Camp Gualala, Annapolis, California

Ms. Scothern was the environmental assessor for a youth camp located in the redwood forest of California. The subject property encompassed 440 acres, of which approximately 10 to 15 acres were developed with the youth camp. The visual inspection focused on the developed camp area. Numerous environmental features were located on the camp property, such as water tanks, septic systems, a maintenance shop, and several non-suspect camp buildings. California regulations were researched in terms of water quality and permit status. This project presented a unique opportunity to work with another state's regulatory requirements and state divisions. Again, a detailed review of historical aerial photographs and the identification of other historical resources were essential for evaluating a large majority of the camp's undeveloped property.

Truman Arnold Companies – Million Air Properties, Provo Municipal Airport

Ms. Scothern was the environmental assessor for the investigation of Provo Municipal Airport, Utah. As the environmental assessor, Ms. Scothern investigated the main terminal building, maintenance and storage hangars, and an AST farm area. The site was also a closed LUST site and historically part of a trap and shooting range. Issues identified at the site included lack of secondary containment in the AST farm area, possible soil and groundwater impacts from the historical on-site LUST, possible soil impacts from the former use of the area as a trap and shooting range, connection of a maintenance floor drain to the city system, and observed staining from stored fueling hoses and a compressor. Further investigations were recommended to evaluate if soil and groundwater impacts were present in the AST farm area and in the former LUST area. A scope to verify the maintenance floor drain connection to the city wastewater discharge system was recommended, as well as investigations to determine if impacts were present at the property due to staining in the hose storage area. Last, IHI recommended, due to the industrial use of the property since the 1940s, if the property were redeveloped, the developer should be aware of the possibility that impacted soils may still be present at the site, and to properly classify and dispose of any encountered impacts. As part of the investigation process, several governmental entities were contacted; aerial, city directory, and Sanborn maps were reviewed for historical purposes; and a regulatory review was performed.

KENT R.WHEELER, PG
REGIONAL MANAGER

PROFESSIONAL EXPERIENCE

Mr. Wheeler's responsibilities include providing environmental-related consulting services encompassing a wide range of projects, from Superfund liability associated with property transactions and hazardous waste cleanups to groundwater and soil-contaminant investigations. His expertise lies in the compilation and evaluation of hydrogeologic data, including subsurface soil and groundwater information, synthesizing the data with potential release scenarios and developing integrated management strategies. The development of innovative risk-based remedial strategies have provided substantial savings to a diverse group of clients, including prospective sellers and purchasers of real estate, industrial, and commercial clients with CERCLA, RCRA, and LUST issues.

Mr. Wheeler has extensive experience interacting with regulatory agencies, including EPA, Utah Voluntary Cleanup Program (VCP), Utah DERR, Utah DSHW, and Utah DAQ. He interacts closely with clients, lawyers, and regulatory personnel on a routine basis, acting as Senior Project Manager on many large environmental projects. He has managed CERCLA Investigations and Removal Actions, RCRA Facility Investigations and Remedial Actions, SMCRA Mine Reclamation projects, LUST Investigations and Corrective Actions, Air Quality Permitting actions and provided review and consultation to legal counsel on numerous large-scale property investigations. During his tenure, Mr. Wheeler has provided expert witness services on a variety of cases, including mine reclamation, groundwater contamination, snow hydrology, and geology.

PROJECT EXPERIENCE

RCRA Closure of Arsenic Release at Silicon Chip Manufacturing Plant

As Assistant Project Manager, Mr. Wheeler oversaw the remedial investigation at the Crystal Specialties facility and authored the feasibility study for the cleanup of approximately 1,000 yds.^{3} of arsenic-contaminated soils. Mr. Wheeler assisted in the development of an innovative cleanup method and presented it to the regulatory agency overseeing the cleanup. The approval of this method reduced the volume of soils needing to be disposed by over 30 percent. Mr. Wheeler was promoted to Project Manager for the implementation of the CAP, where the arsenic-contaminated soils were excavated, screened and disposed of at an approved facility. The entire CAP was completed within three months. Mr. Wheeler designed a long-term monitoring program that met RCRA requirements for statistical validation of contaminant trends.

Voluntary Closure of Oil Pipeline Pump Station

Mr. Wheeler was the Senior Project Manager of a subsurface investigation and remediation effort of a former pumping station for an oil pipeline outside Salinas, California. The facility had been a pumping station along a crude oil pipeline in the early 1900s. The site investigation included defining soil impacts and groundwater impacts, and determining the extent

Education

M.S., Watershed Sciences, Colorado State University, 1987

B.S., Geology, Western State College, 1983

Supplemental Education

USGS Finite Difference Groundwater Modeling: OSMRE Advanced Hydrology & Cumulative Hydrologic Impacts; State of Utah ASTM LUST Risk-Based Corrective Action

Registrations

Professional Geologist, Utah, #5274992-2250

Work History

Terracon Consultants, Inc., Regional Manager, September 1, 2012-Present

IHI Environmental, Inc., Manager, Environmental Services & Senior Hydrogeologist, 1989-2012

EnviroSearch, Senior Hydrogeologist, 1988-1989

State of Utah, Division of Oil, Gas & Mining, Reclamation Hydrologist, 1987-1988

of a free product plume. Over two acres of land were impacted from the surface to over 25 feet below ground surface (bgs). A Risk Assessment was used to establish Action Levels and a Corrective Action Plan (CAP) was prepared which eliminated the exposure pathways and protected groundwater. Approximately 12,000 yds^3 of the most highly impacted soils were excavated and mixed with less impacted soils; this material was placed above groundwater and capped with low permeability soils to stop infiltration. This project was performed for the Church of Jesus Christ of Latter-day Saints. Costs for using traditional remediation technologies ranged from $850,000 to $1,500,000. Mr. Wheeler's innovative approach cost the client less than $350,000.

Methane Extraction and Monitoring

During the development of a large regional mall in Provo, Utah, methane-bearing soils were encountered underlying the footprint of the building. The site had to be investigated and the extent and source of the methane plume determined. A soil vapor extraction system was then designed and installed, while allowing construction activities to continue. Mr. Wheeler oversaw the engineering and construction plans and oversaw the installation and operation of the system. Through the active extraction process, methane concentrations were reduced to safe levels in all targeted areas of the development and a passive extraction system is now in place.

Complex Property Transactions

As the Senior Environmental Professional and senior reviewer for all property transactions for the last 15 years, Mr. Wheeler has overseen the completion of thousands of Phase I ESAs and Limited Site Investigations (Phase II SI). The property issues have included CERCLIS and RCRA sites, leaking underground storage tanks, construction waste landfills, suspect lease operations, Brownfields, wetlands issues, vapor intrusion, and groundwater impacts from on- and off-site sources. The sites were impacted by a wide variety of contaminants, including PCE and TCE, PCBs and PNAs, lead, arsenic, mercury, and petroleum hydrocarbons. Mr. Wheeler works closely with many attorneys, corporate managers and regulatory personnel in evaluating risks associated with potential property acquisitions. Working in this environment, Mr. Wheeler recognizes the need to identify and quantify risks quickly, and identify workable solutions.

RCRA Hazardous Waste Identification and Disposal

Mr. Wheeler was the Project Manager for the cleanup of an aerospace manufacturing facility that had declared bankruptcy. This cleanup involved characterizing and disposing of over 5,000 gallons of liquid hazardous wastes and caustic chemicals and chlorinated solvents, as well as the characterization and disposal of approximately 50 unmarked drums containing hazardous wastes. This project was performed for Wells Fargo Bank.

Lead/Arsenic Remediation

Mr. Wheeler managed this CERCLA project from the initial identification of the site during a Phase II ESA through the final closure of the site, using a Non-time Critical Removal Action overseen by EPA. This site involved the identification, assessment, and remediation of a mile-long railroad yard that was impacted by high levels of arsenic and lead. Because this rail yard was a key component in the Utah Transit Authority's light-rail project in Salt Lake City, it had to be completed within 18 months of the initial contact with EPA. By using a Brownfields approach of "starting with the end in mind," this project was designed and managed in a manner that resulted in savings of over $6 million to the client. In addition the project was completed within 18 months, from the initial site investigation through the completion of the Removal Action. Mr. Wheeler worked closely with EPA and Utah DERR personnel throughout the project to ensure the timely closure of the property.

This expedited timeframe required almost weekly, if not, daily contacts with the client, legal counsel, EPA, UDEQ-DERR, and several PRPs, including Union Pacific Railroad and ASARCO, as well as property owners along the right-of-way. EPA cited this site as an example of how to expedite the investigation and restore CERCLA sites.

PCE Plume Investigation and Remedial Action

Mr. Wheeler acted as the Senior Project Manager for the voluntary RCRA investigation of a large PCE plume in Salt Lake City. The plume extended approximately one half mile from the facility under adjoining properties. The investigation included designing a Sampling Plan that not only defined soil impacts in the source area to a depth of over 50 feet, but a network of monitoring wells that were sufficient to define a ¼ mile-long groundwater plume. Additionally, because of the high concentrations, vapor monitoring was required in residential houses to ensure de minimis exposures to homeowners.

This initial stage also included the design of a removal action of source material that extended over 30 feet below the ground surface. Mr. Wheeler worked with the State to allow the majority of the soil to be disposed of as non-hazardous wastes, resulting in significant savings.

VCP Cleanup

Mr. Wheeler acted as the Senior Project Manager for the remediation and closure of the former Utah Barrel facility, through the Utah Voluntary Cleanup Program. This cleanup was negotiated and implemented on a fast track, allowing the client to get tax credits and LEEDS credits for the development. The innovative design of the remediation allowed the removal and disposal of PCB, lead- and arsenic-impacted soils, as well as the remediation of a petroleum-contaminated groundwater plume, in less than 8 months. The ability to complete this work from site investigation to remediation under the oversight of the VCP in this short time frame is what allowed the project to be financially viable.

Key Bank Tower Building Implosion

During the redevelopment of the City Creek Center in downtown Salt Lake City, The Church of Jesus Christ of Latter-day Saints recognized that imploding the Key Bank Building would result in huge cost and time savings. However, at that time the State Division of Air Quality had an “unofficial” hold on issuing permits for building implosions in the Salt Lake air shed. Mr. Wheeler was retained to write and obtain the permit, and oversee the air quality monitoring, before, during and after the event. He was selected as the Senior PM by the LDS Church because of his strong relationships with the regulatory agencies and his knowledge and proven abilities to move projects through the regulatory system.

APPENDIX F
DESCRIPTION OF TERMS AND ACRONYMS

Description of Selected General Terms and Acronyms

Term/Acronym	*Description*
ACM	Asbestos Containing Material. Asbestos is a naturally occurring mineral, three varieties of which (chrysotile, amosite, crocidolite) have been commonly used as fireproofing or binding agents in construction materials. Exposure to asbestos, as well as ACM, has been documented to cause lung diseases including asbestosis (scarring of the lung), lung cancer and mesothelioma (a cancer of the lung lining). Regulatory agencies have generally defined ACM as a material containing greater that one (1) percent asbestos, however some states (e.g. California) define ACM as materials having 0.1% asbestos. In order to define a homogenous material as non-ACM, a minimum number of samples must be collected from the material dependent upon its type and quantity. Homogenous materials defined as non-ACM must either have 1) no asbestos identified in all of its samples or 2) an identified asbestos concentration below the appropriate regulatory threshold. Asbestos concentrations are generally determined using polarized light microscopy or transmission electron microscopy. Point counting is an analytical method to statistically quantify the percentage of asbestos in a sample. The asbestos component of ACM may either be friable or non-friable. Friable materials, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure and have a higher potential for a fiber release than non-friable ACM. Non-friable ACM are materials that are firmly bound in a matrix by plastic, cement, etc. and, if handled carefully, will not become friable. Federal and state regulations require that either all suspect building materials be presumed ACM or that an asbestos survey be performed prior to renovation, dismantling, demolition, or other activities that may disturb potential ACM. Notifications are required prior to demolition and/or renovation activities that may impact the condition of ACM in a building. ACM removal may be required if the ACM is likely to be disturbed or damaged during the demolition or renovation. Abatement of friable or potentially friable ACM must be performed by a licensed abatement contractor in accordance with state rules and NESHAP. Additionally, OSHA regulations for work classification, worker training and worker protection will apply.
AHERA	Asbestos Hazard Emergency Response Act
AST	Aboveground Storage Tanks. ASTs are generally described as storage tanks less than 10% of which are below ground (i.e., buried). Tanks located in a basement, but not buried, are also considered ASTs. Whether, and the extent to which, an AST is regulated, is determined on a case-by-case basis and depends upon tank size, its contents and the jurisdiction of its location.
BGS	Below Ground Surface
Brownfields	State and/or tribal listing of Brownfield properties addressed by Cooperative Agreement Recipients or Targeted Brownfields Assessments.
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes. BTEX are VOC components found in gasoline and commonly used as analytical indicators of a petroleum hydrocarbon release.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (a.k.a. Superfund). CERCLA is the federal act that regulates abandoned or uncontrolled hazardous waste sites. Under this Act, joint and several liability may be imposed on potentially responsible parties for cleanup-related costs.
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System. An EPA compilation of sites having suspected or actual releases of hazardous substances to the environment. CERCLIS also contains information on site inspections, preliminary assessments and remediation of hazardous waste sites. These sites are typically reported to EPA by states and municipalities or by third parties pursuant to CERCLA Section 103.
CESQG	Conditionally exempt small quantity generators.
CFR	Code of Federal Regulations

Description of Selected General Terms and Acronyms (cont.)

Term/Acronym	*Description*
CREC	Controlled Recognized Environmental Condition is defined in ASTM E1527-13 as "a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (for example, as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority) , with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls). A condition considered by the environmental professional to be a controlled recognized environmental condition shall be listed in the findings section of the Phase I Environmental Site Assessment report, and as a recognized environmental condition in the conclusions section of the Phase I Environmental Site Assessment report."
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System. An EPA-maintained federal database which stores information on notifications of oil discharges and hazardous substance releases in quantities greater than the applicable reportable quantity under CERCLA. ERNS is a cooperative data-sharing effort between EPA, DOT, and the National Response Center.
ESA	Environmental Site Assessment
FRP	Fiberglass Reinforced Plastic
Hazardous Substance	As defined under CERCLA, this is (A) any substance designated pursuant to section 1321(b)(2)(A) of Title 33, (B) any element, compound, mixture, solution, or substance designated pursuant to section 9602 of this title; (C) any hazardous waste having characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (with some exclusions); (D) any toxic pollutant listed under section 1317(a) of Title 33; (E) any hazardous air pollutant listed under section 112 of the Clean Air Act; and (F) any imminently hazardous chemical substance or mixture with respect to which the EPA Administrator has taken action under section 2606 of Title 15. This term does not include petroleum, including crude oil or any fraction thereof which is not otherwise listed as a hazardous substance under subparagraphs (A) through (F) above, and the term include natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).
Hazardous Waste	This is defined as having characteristics identified or listed under section 3001 of the Solid Waste Disposal Act (with some exceptions). RCRA, as amended by the Solid Waste Disposal Act of 1980, defines this term as a "solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed."
HREC	Historical Recognized Environmental Condition is defined in ASTM E1527-13 as "a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted residential use criteria established by a regulatory authority, without subjecting the property to any required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls). Before calling the past release a historical recognized environmental condition, the environmental professional must determine whether the past release is a recognized environmental condition at the time of the Phase I Environmental Site Assessment is conducted (for example, if there has been a change in the regulatory criteria). If the EP considers the past release to be a recognized environmental condition at the time the Phase I ESA is conducted, the condition shall be included in the conclusions section of the report as a recognized environmental condition."

IC/EC	A listing of sites with institutional and/or engineering controls in place. IC include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls. EC include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.
ILP	Innocent Landowner/Operator Program
LQG	Large quantity generators.
LUST	Leaking Underground Storage Tank. This is a federal term set forth under RCRA for leaking USTs. Some states also utilize this term.
MCL	Maximum Contaminant Level. This Safe Drinking Water concept (and also used by many states as a ground water cleanup criteria) refers to the limit on drinking water contamination that determines whether a supplier can deliver water from a specific source without treatment.
MSDS	Material Safety Data Sheets. Written/printed forms prepared by chemical manufacturers, importers and employers which identify the physical and chemical traits of hazardous chemicals under OSHA's Hazard Communication Standard.
NESHAP	National Emissions Standard for Hazardous Air Pollutants (Federal Clean Air Act). This part of the Clean Air Act regulates emissions of hazardous air pollutants.
NFRAP	Facilities where there is "No Further Remedial Action Planned," as more particularly described under the Records Review section of this report.
NOV	Notice of Violation. A notice of violation or similar citation issued to an entity, company or individual by a state or federal regulatory body indicating a violation of applicable rule or regulations has been identified.
NPDES	National Pollutant Discharge Elimination System (Clean Water Act). The federal permit system for discharges of polluted water.
NPL	The NPL is the EPA's database of uncontrolled or abandoned hazardous waste facilities that have been listed for priority remedial actions under the Superfund Program.
OSHA	Occupational Safety and Health Administration or Occupational Safety and Health Act
PACM	Presumed Asbestos-Containing Material. A material that is suspected of containing or presumed to contain asbestos but which has not been analyzed to confirm the presence or absence of asbestos.

Description of Selected General Terms and Acronyms (cont.)

Term/Acronym	*Description*
PCB	Polychlorinated Biphenyl. A halogenated organic compound commonly in the form of a viscous liquid or resin, a flowing yellow oil, or a waxy solid. This compound was historically used as dielectric fluid in electrical equipment (such as electrical transformers and capacitors, electrical ballasts, hydraulic and heat transfer fluids), and for numerous heat and fire sensitive applications. PCB was preferred due to its durability, stability (even at high temperatures), good chemical resistance, low volatility, flammability, and conductivity. PCBs, however, do not break down in the environment and are classified by the EPA as a suspected carcinogen. 1978 regulations, under the Toxic Substances Control Act, prohibit manufacturing of PCB-containing equipment; however, some of this equipment may still be in use today.
pCi/L	Pico Curies per Liter of Air. Unit of measurement for Radon and similar radioactive materials.
PLM	Polarized Light Microscopy (see ACM section of the report, if included in the scope of services)
PST	Petroleum Storage Tank. An AST or UST that contains a petroleum product.
Radon	A radioactive gas resulting from radioactive decay of naturally-occurring radioactive materials in rocks and soils containing uranium, granite, shale, phosphate, and pitchblende. Radon concentrations are measured in Pico Curies per Liter of Air. Exposure to elevated levels of radon creates a risk of lung cancer; this risk generally increases as the level of radon and the duration of exposure increases. Outdoors, radon is diluted to such low concentrations that it usually does not present a health concern. However, radon can accumulate in building basements or similar enclosed spaces to levels that can pose a risk to human health. Indoor radon concentrations depend primarily upon the building's construction, design and the concentration of radon in the underlying soil and ground water. The EPA recommended annual average indoor "action level" concentration for residential structures is 4.0 pCi/l.
RCRA	Resource Conservation and Recovery Act. Federal act regulating solid and hazardous wastes from point of generation to time of disposal ('cradle to grave"). 42 U.S.C. 6901 et seq.
RCRA Generators	The RCRA Generators database, maintained by the EPA, lists facilities that generate hazardous waste as part of their normal business practices. Generators are listed as either large (LQG), small (SQG), or conditionally exempt (CESQG). LQG produce at least 1000 kg/month of non-acutely hazardous waste or 1 kg/month of acutely hazardous waste. SQG produce 100-1000 kg/month of non-acutely hazardous waste. CESQG are those that generate less than 100 kg/month of non-acutely hazardous waste.
RCRA CORRACTS/TSDs	The USEPA maintains a database of RCRA facilities associated with treatment, storage, and disposal (TSD) of hazardous materials which are undergoing "corrective action". A "corrective action" order is issued when there is a release of hazardous waste or constituents into the environment from a RCRA facility.
RCRA Non-CORRACTS/TSDs	The RCRA Non-CORRACTS/TSD Database is a compilation by the USEPA of facilities which report storage, transportation, treatment, or disposal of hazardous waste. Unlike the RCRA CORRACTS/TSD database, the RCRA Non-CORRACTS/TSD database does not include RCRA facilities where corrective action is required.
RCRA Violators List	RAATS. RCRA Administrative Actions Taken. RAATS information is now contained in the RCRIS database and includes records of administrative enforcement actions against facilities for noncompliance.
RCRIS	Resource Conservation and Recovery Information System, as defined in the Records Review section of this report.
REC	Recognized Environmental Conditions are defined by ASTM E1527-13 as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: 1)due to any release to the environment; 2) under conditions indicative of a release to the environment. *De minimis* conditions are not recognized environmental conditions."
SCL	State "CERCLIS" List (see SPL /State Priority List, below).

Description of Selected General Terms and Acronyms (cont.)

Term/Acronym	*Description*
SPCC	Spill Prevention, Control and Countermeasures. SPCC plans are required under federal law (Clean Water Act and Oil Pollution Act) for any facility storing petroleum in tanks and/or containers of 55-gallons or more that when taken in aggregate exceed 1,320 gallons. SPCC plans are also required for facilities with underground petroleum storage tanks with capacities of over 42,000 gallons. Many states have similar spill prevention programs, which may have additional requirements.
SPL	State Priority List. State list of confirmed sites having contamination in which the state is actively involved in clean up activities or is actively pursuing potentially responsible parties for clean up. Sometimes referred to as a State "CERCLIS" List.
SQG	Small quantity generator.
SWF/LF	State and/or Tribal database of solid waste/Landfill facilities. The database information may include the facility name, class, operation type, area, estimated operational life, and owner.
TPH	Total Petroleum Hydrocarbons
TRI	Toxic Release Inventory. Routine EPA report on releases of toxic chemicals to the environment based upon information submitted by entities subject to reporting under the Emergency Planning and Community Right to Know Act.
TSCA	Toxic Substances Control Act. A federal law regulating manufacture, import, processing and distribution of chemical substances not specifically regulated by other federal laws (such as asbestos, PCBs, lead-based paint and radon). 15 U.S.C 2601 et seq.
USACE	United States Army Corps of Engineers
USC	United States Code
USGS	United States Geological Survey
USNRCS	United States Department of Agriculture-Natural Resource Conservation Service
UST	Underground Storage Tank. Most federal and state regulations, as well as ASTM E1527-13, define this as any tank, incl., underground piping connected to the tank, that is or has been used to contain hazardous substances or petroleum products and the volume of which is 10% or more beneath the surface of the ground (i.e., buried).
VCP	State and/or Tribal facilities included as Voluntary Cleanup Program sites.
VOC	Volatile Organic Compound
Wetlands	Areas that are typically saturated with surface or ground water that creates an environment supportive of wetland vegetation (i.e., swamps, marshes, bogs). The Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1) defines wetlands as areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. For an area to be considered a jurisdictional wetland, it must meet the following criteria: more than 50 percent of the dominant plant species must be categorized as Obligate, Facultative Wetland, or Facultative on lists of plant species that occur in wetlands; the soil must be hydric; and, wetland hydrology must be present. The federal Clean Water Act which regulates "waters of the US," also regulates wetlands, a program jointly administered by the USACE and the EPA. Waters of the U.S. are defined as: (1) waters used in interstate or foreign commerce, including all waters subject to the ebb and flow of tides; (2) all interstate waters including interstate wetlands; (3) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, etc., which the use, degradation, or destruction could affect interstate/ foreign commerce; (4) all impoundments of waters otherwise defined as waters of the U. S., (5) tributaries of waters identified in 1 through 4 above; (6) the territorial seas; and (7) wetlands adjacent to waters identified in 1 through 6 above. Only the USACE has the authority to make a final wetlands jurisdictional determination.

2016a Terracon Consultants, Inc., 2016. *Phase II Environmental Site Assessment, North Temple Brownfields Assessment, EPA Cooperative Agreement No. 96809601, Hazardous Substance Grant for Redevelopment Agency of Salt Lake City – Schovaers Electronics Facility, 22 South Jeremy Street, Salt Lake City, Utah, ACRES ID #199723, Terracon Project No. AL127481*. Dated February 8, 2016.

Phase II Environmental Site Assessment

North Temple Brownfields Assessment

EPA Cooperative Agreement No. 96809601

Hazardous Substance Grant for Redevelopment Agency of Salt Lake City

Schovaers Electronics Facility

22 South Jeremy Street, Salt Lake City, Utah

ACRES ID #199723

February 8, 2016

Terracon Project No. AL127481

Prepared for:

The Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

Prepared by:

Terracon Consultants, Inc.
Salt Lake City, Utah

February 8, 2016

Salt Lake City Corporation
Division of Sustainability and the Environment
P.O. Box 145467
Salt Lake City, Utah 84114

Attn: Ms. Debbie Lyons
P: 801-535-7795
E: debbie.lyons@slcgov.com

Re: Phase II Environmental Site Assessment
North Temple Brownfields Assessment
EPA Cooperative Agreement No. 96809601
Hazardous Substance Grant for Redevelopment Agency of Salt Lake City
Schovaers Electronics Facility, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. AL127481

Dear Ms. Lyons:

Terracon Consultants, Inc. (Terracon) is pleased to submit our report for Phase II Site Investigation activities completed at the above-referenced site. EPA approved this site for eligibility under a Site Eligibility Determination Outline (EPA Region 8, February 6, 2015). The report presents data from recent field activities that included completion of soil borings; installation of temporary piezometers; and the collection of soil and groundwater samples for laboratory analyses. This investigation was conducted under EPA Cooperative Agreement #96809601 for the Hazardous Substance Grant. This Phase II Site Investigation was conducted as part of Task 4 of the Cooperative Agreement Work Plan approved by EPA on July 30, 2012.

Terracon appreciates this opportunity to provide environmental support services to Salt Lake City Corporation and The Redevelopment Agency of Salt Lake City. Should you have any questions or require additional information, please do not hesitate to contact our office.

Sincerely,
Terracon Consultants, Inc.

W. Wynn John
Senior Project Manager – Environmental

Andy R. King
Senior Project Manager - Environmental

WWJ/ARK/dekAPR3

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PHASE II ENVIRONMENTAL SITE ASSESSMENT
NORTH TEMPLE BROWNFIELDS ASSESSMENT
EPA COOPERATIVE AGREEMENT NO. 96809601
HAZARDOUS SUBSTANCE GRANT FOR
REDEVELOPMENT AGENCY OF SALT LAKE CITY
SCHOVAERS ELECTRONICS FACILITY
22 SOUTH JEREMY STREET, SALT LAKE CITY, UTAH
ACRES ID #199723

Terracon Project No. AL127481
February 8, 2016

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed a Phase II Site Investigation at the Schovaers Electronics property located at 22 South Jeremy Street as described in the approved Sampling and Analysis Plan (SAP), dated October 16, 2015. This Phase II Site Investigation was completed with funding from the North Temple Brownfields Assessment Grant for The Redevelopment Agency of Salt Lake City.

1.1 Brownfields Setting

Salt Lake City Corporation received a Brownfields Assessment Grant to support long-term urban renewal along the North Temple Corridor. The purpose of the Assessment Grant is to identify environmentally compromised sites within the North Temple Project Area and develop a strategy for assessing potential impacts, evaluating redevelopment potential, cleanup objectives, and mitigation strategies. Twenty-four Phase I Environmental Site Assessments (ESAs) were conducted throughout the North Temple Project Area in 2010; the results of the 2010 ESAs were used to develop an inventory of potentially contaminated properties within the North Temple Project Area.

The Schovaers Electronics property located at 22 South Jeremy Street in Salt Lake City is identified in EPA's online Assessment, Cleanup and Redevelopment Exchange System (ACRES) as Number 199723. This property was previously approved for assessment by EPA under a Site Eligibility Determination Outline (EPA Region 8, February 6, 2015). Historically, the property operated subject to the Resource Conservation and Recovery Act (RCRA), and documentation indicates historical regulatory inspections without known violations. The property is not currently subject to RCRA permit or RCRA corrective action order.

As part of the Brownfields Assessment Grant, a Phase I ESA was conducted on the Schovaers Electronics site (Terracon, 2015a). Exhibit 1 (Appendix A) depicts the location of the site.

1.2 Site Description and Background

Site Name	Schovaers Electronics (the site)
Site Location/Address	22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #	199723
General Site Description and Use	The site is an approximately 0.34-acre parcel (Parcel ID #15-02-204-007) owned by Schovaers Electronics. An approximately 6,000-square-foot industrial building occupies the site. An approximately 400-square-foot garage is present on the northwest side of the site. Paved parking areas are located to the east and north of the building. A small weedy area is present on the western boundary area. Schovaers Electronics currently occupies the site, and manufactures circuit boards.

Terracon previously conducted a Phase I Environmental Site Assessment (ESA) on the site to identify Recognized Environmental Conditions (RECs) in connection with the property (Terracon, 2015a). The Phase I ESA was compliant with All Appropriate Inquiry requirements for Brownfield cooperative agreement recipients and was performed in conformance with the scope and limitations of ASTM International (ASTM) E1527-13: Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for the property occupied by for the parcel located at 22 South Jeremy Street in Salt Lake City, Salt Lake County, Utah. The purpose of the Phase I ESA was to identify RECs in connection with the site, including the building and other improvements located on the site at the time of the reconnaissance.

Electroplating operations are conducted at the facility which includes a photo room, film tooling room, rout room, drill room and plating room storage areas and small office areas. Daily operations at the site include taking copper encapsulated circuit boards and imprinting specific client specification for components to the boards. Overflow water from the plating tanks and spent solutions drain directly on the wooden pallet flooring in the room, which is collected by the sump in the room. The sump is located next to the wastewater treatment system in the southeast corner of the plating room. The wastewater is treated then discharged into the sanitary sewer system. Historically, etchant from the plating room was observed to have leaked out of the building through the building's seams and concrete flooring. Because of this, a liner was installed above the concrete slab in the plating room for more efficient discharge of overflow water into the sump.

According to the 2015 Phase I ESA conducted by Terracon, the site was residential from at least 1898 to the mid-1900s. The residences were demolished and the current commercial building was constructed by 1962. The site building was originally occupied by an electrical supply company and then a wholesale upholstery business before Schovaers occupied the building in

1977. Use of the site as an electroplating facility for the past 38 years represents a REC to the site.

The site is bordered by the following adjoining properties:

- North – Crown Plating (8 and 14 South Jeremy Street);
- East – Jeremy Street and Heritage Forge Inc. (15 South Jeremy Street);
- South – Liberty Auto Work (42 South Jeremy Street);
- West – EPC International Warehouse (25 South 900 West).

Terracon's 2015 Phase I ESA identified the following on-site REC in connection with the site:

- **Long-term industrial use:** The site has been an electroplating shop for approximately 38 years. Evidence of releases from these industrial operations included leaking and spilling.

Terracon's 2015 Phase I ESA identified the following off-site RECs in connection with the site:

- The north adjacent property (Crown Plating) has documented improper disposal of 1,1,1-TCA very near or on the property line. This identified release represents a REC to the subject property.

1.3 Standard of Care

Terracon's services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time. Terracon makes no warranties, either express or implied, regarding the findings, conclusions, or recommendations. Please note that Terracon does not warrant the work of laboratories, regulatory agencies, or other third parties supplying information used in the preparation of the report. These Phase II services were performed in accordance with the scope of work agreed with you, our client, as reflected in our proposal and consistent with ASTM E1903-11, *Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment.*

1.4 Additional Scope Limitations

Findings, conclusions, and recommendations resulting from these services are based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, non-detectable, or not present during these services. We cannot represent that the site contains no hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during this Phase II investigation. Subsurface conditions may vary from those encountered at specific borings or wells or during other surveys,

tests, assessments, investigations, or exploratory services. The data, interpretations, findings, and our recommendations are based solely upon data obtained at the time and within the scope of these services.

1.5 Reliance

This report has been prepared for the exclusive use of Salt Lake City Corporation and the property owner (Schovaers Electronics). Any authorization for use or reliance by any other party (except a governmental entity having jurisdiction over the site) is prohibited without the express written authorization of Salt Lake City Corporation and Terracon. Reliance by authorized parties will be subject to the terms, conditions, and limitations stated in the Salt Lake City Environmental and Sustainability Services contract. The limitation of liability defined in the terms and conditions is the aggregate limit of Terracon's liability all relying parties unless otherwise agreed in writing.

2.0 PHASE II SITE INVESTIGATION

2.1 Scope

The Phase II Site Investigation was conducted to evaluate potential impacts to soil and groundwater associated with the aforementioned RECs. A Building Materials Survey was also conducted to evaluate the potential presence of asbestos-containing materials (ACM) and other hazardous materials. These activities were conducted in accordance with a site-specific Sampling and Analysis Plan (SAP, Terracon 2015b) that was prepared and approved by EPA for this site. The SAP established specific site objectives, sampling process design, and details regarding site-specific sampling and analyses, and was used in conjunction with the EPA-approved Quality Assurance Project Plan (QAPP, Terracon 2014). A Safety and Health Plan (SHP, Terracon 2015c) was also prepared to perform the field work under EPA Level D personal protective equipment.

2.2 Sampling Process Design

The sampling strategy for soil and groundwater was designed to provide a reasonable "worst-case" characterization of conditions where contaminants, if present, are most likely to be at high concentrations. This involved advancing soil borings to allow collection of soil and groundwater samples as closely as practical to the features of concern that were previously identified, including:

- the Plate Shop;
- the north loading dock;
- the northern portion of the property and along the property boundary where improper disposal of wastes at the adjacent property (to the north) has been documented; and,
- the eastern property boundary to evaluate whether potential up-gradient, off-site impacts have migrated to the site.

The sampling strategy was also designed to evaluate the overall extent of contamination, if present, on the site and in the presumed down-gradient direction from the features of concern. This involved sampling near the western property boundary, west and southwest of the features of concern. The sampling design also included completion of three of the borings as temporary piezometers to allow evaluation of the local groundwater flow conditions.

Laboratory analyses of soil and groundwater were focused primarily on volatile organic compounds (VOCs) and metals. The following Table 1 provides a summary of the samples, including planned sampling locations, sample identifications, sample types, laboratory analyses, and sampling rationale. The drilling and sampling locations are shown on the Site Diagram (Exhibit 2, Appendix A).

TABLE 1 – SAMPLE SUMMARY

Sample Description	Rationale	Sample IDs*	Sample Type	Analytes
Plate Room	Evaluate potential impacts from Plate Room spills, and material handling at former loading dock (southwest corner). Chemical seepage observed on exterior walls.	SE-SB-01 SE-SB-02** SE-SB-03 SE-SB-04 SE-SB-05 SE-SB-06	soil	13 PP Metals[a] Hexavalent Chromium VOCs[b] pH
		SE-SB-01 SE-SB-02 SE-SB-03 SE-SB-04 SE-SB-05 SE-SB-06	groundwater	13 PP Metals[a] Hexavalent Chromium VOCs[b] pH
North Loading Dock	Evaluate potential impacts from material handling at loading dock and adjacent properties.	SE-SB-07 SE-SB-08 SE-SB-09	soil	13 PP Metals[a] Hexavalent Chromium VOCs[b] pH
		SE-SB-07 SE-SB-08 SE-SB-09	groundwater	13 PP Metals[a] Hexavalent Chromium VOCs[b] pH
North Boundary	Evaluate potential	SE-SB-10 SE-SB-11	soil	13 PP Metals[a]

	impacts from documented improper waste disposal (1,1,1-TCA and CrVI) at north adjacent property.	SE-SB-12		Hexavalent Chromium VOCs[b] pH
		SE-SB-10 SE-SB-11 SE-SB-12	groundwater	13 PP Metals[a] Hexavalent Chromium VOCs[b] pH
East Boundary	Evaluate potential impacts from upgradient industrial activities.	SE-SB-13** SE-SB-14 SE-SB-15**	soil	13 PP Metals[a] Hexavalent Chromium VOCs[b] pH
		SE-SB-13 SE-SB-14 SE-SB-15	groundwater	13 PP Metals[a] Hexavalent Chromium VOCs[b] pH

a – 13

Priority Pollutant Metals
b – Volatile Organic Compounds
* - soil samples are identified by their sample depth, i.e. SE-SB-01@1-2'
** - completed as a temporary piezometer for use in evaluating groundwater flow conditions

2.3 Field Data Collection

Prior to SAP approval and assessment activities, a property access agreement was executed with the property owner. The public utility location service (Blue Stakes of Utah) was notified at least 48 hours prior to commencing any drilling activities. A private utility location service was also used to locate potential utilities or other subsurface obstacles in the immediate vicinity of each boring location.

On November 11 and 12, 2015, Terracon mobilized to the site to advance soil borings for collection of subsurface soil and groundwater samples. Mechanized drilling services were performed by a Utah-licensed well driller using direct-push drilling equipment. Terracon environmental personnel directed and supervised the drilling activities, logged the soil borings, and collected field samples and groundwater elevation data. At all boring locations, access conditions allowed the use of a track-mounted direct-push drilling rig.

During advancement of the soil borings, soils were continuously cored in 5-foot intervals and observed to document subsurface soil types, color, relative moisture content, and sensory evidence of environmental impacts. The soil samples were also field-screened using a portable photoionization detector (PID) – Mini Rae 2000 PID equipped with a 10.6 eV ultraviolet lamp to

evaluate the potential presence of total volatile organic compounds (TVOCs). The unit measures TVOCs in sample headspace air relative to parts per million calibration gas equivalents in air and identified simply as "PPM" on soil boring logs. This is not a direct equivalent measurement of TVOCs or a specific contaminant in headspace air or sample media in parts per million analytical units produced by a laboratory. PID readings are qualitative measurements used to guide sampling in the field.

The soil borings were advanced to maximum depths of approximately 15 feet below grade surface (bgs). The subsurface soil types encountered generally consisted of gravel fill materials near the surface underlain by silts and clays, which in turn were typically underlain by fine to coarse water-bearing sands. PID readings ranged from 0 to 2.3 ppm. Groundwater was typically encountered during drilling at depths of approximately 10 to 12 feet bgs. Detailed lithological descriptions and PID readings are included on the soil boring logs provided in Appendix B.

The sampling points were advanced, where access permitted, at or as closely as practical to potential source areas while maintaining system/containment integrity and without disruption of facility operations. At this site, no borings were advanced inside the building due to lack of access for drilling equipment, and because drilling within the electroplating process areas would penetrate and compromise the integrity of the facility's spill containment system. The exact location of each boring was dictated by the drilling equipment's access constraints. Such access constraints included existing vegetation, subsurface and overhead utilities, limited working space, and other obstacles associated with the facility operations. Wherever possible, off-set boring locations were biased such that they were placed on the presumed down-gradient side (west or southwest) of any feature of concern that was inaccessible.

2.4 Soil Sampling

Unless otherwise indicated, one soil sample was collected from each soil boring for VOC analyses from the zone exhibiting the highest PID readings. If no elevated PID reading was observed, the sample was collected from the capillary fringe zone, from the interval exhibiting a change in lithology, from the bottom of the boring, or from the interval most likely to contain environmental impacts as determined in the field by the sampling professional. If impacts were not observed, one soil sample was collected from the soil-groundwater interface. One soil sample was also collected at a shallow (near surface) depth from each boring for metals analyses based on lithologic observations and professional judgement of the sampler. All soil samples were placed in pre-labeled laboratory-prepared glassware and placed on ice in a cooler.

2.5 Groundwater Sampling

Unless otherwise indicated, groundwater samples were collected from each boring (converted to a temporary groundwater sampling point using direct push tooling with a retractable well screen), using a low-flow peristaltic pump. A section of dedicated polyethylene sample tubing was inserted into the drive point. The sample tubing was connected to a dedicated section of flexible

polyethylene hose at the surface. This tubing was passed through a low-flow peristaltic hose pump used to develop the sampling point, as needed to reduce turbidity and purge the water column within the tool. Following probe development, the peristaltic pump was used to collect a groundwater sample directly into the appropriate laboratory-provided containers.

2.6 Field QA/QC Samples

Field duplicate samples for soil and groundwater were collected at a rate of 10 percent. For this investigation, two field duplicate soil and groundwater samples were collected. Two of the borings (SE-SB-05 and SE-SB-08) were selected for collection of duplicate soil and groundwater samples. The duplicates were given a fictitious identification so that the laboratory would be unaware of their duplicate status. The duplicate soil and groundwater sample set collected from boring HF-SB-05 was designated as "SE-SB-100." The duplicate sample set from boring SE-SB-08 was designated as "SE-SB-101."

2.7 Equipment Decontamination

Non-expendable sampling equipment and downhole equipment (water level indicator) was decontaminated at the beginning of the project and decontaminated between each sampling location. These items were hand-scrubbed in an Alconox™ and potable water solution and rinsed with potable water between sample locations. Drilling equipment was cleaned using a high-pressure washer prior to beginning the project and between boring locations.

2.8 Groundwater Gradient Evaluation

Three of the borings (SE-SB-02, SE-SB-13, and SE-SB-15) were completed as temporary piezometers, after the soil and groundwater samples had been collected from the borings. The piezometers were constructed using 10-foot lengths of 1-inch diameter polyvinyl chloride (PVC) slotted well screen placed from approximately 15 to 5 feet bgs, with blank casing extending above the ground surface. Clean silica sand filter pack was placed from the bottom of the piezometers to approximately one to two feet above the top of the screen, followed by a hydrated bentonite chip annular seal to within ½ foot bgs. The piezometers were capped and allowed to recharge overnight. On the following day, a decontaminated electronic water-level indicator, accurate to 0.01 foot, was used to measure depths to groundwater relative to the tops of the piezometer casing. Elevations of the tops of the piezometer casings were surveyed relative to an arbitrary on-site benchmark assigned a reference elevation of 100.00 feet. The measured depths to groundwater were subtracted from the surveyed casing elevations to derive the groundwater surface elevations. The groundwater elevation measurements are summarized in Table C1 (Appendix C). The surface elevations were contoured to derive the local groundwater flow direction and gradient. Based on these measurements, the groundwater flow direction was to the west-southwest, as depicted in Exhibit 3 (Appendix A), with a relatively low gradient of approximately 0.0025 feet per foot. Groundwater flow direction may vary seasonally and by location in the general vicinity of the site, based on available information regarding groundwater

flow conditions from previous investigations at several regulated facilities within a half-mile radius of the site.

2.9 Site Restoration

After sample collection was completed, each boring was properly abandoned by backfilling with bentonite clay pellets, adding water to hydrate the bentonite clay, and restoring the surface with native soil, asphalt, or concrete patch as appropriate to match the surrounding area. For those borings that are completed as temporary piezometers, the casings were removed prior to completing the above steps.

2.10 Building Materials Survey

Terracon conducted a Building Material Survey (BMS) on October 23, 2015. This activity included sampling to evaluate the potential presence of asbestos-containing materials (ACM) and universal hazardous wastes (UHW). A Utah-certified Asbestos Inspector conducted a visual assessment to identify suspect materials such as wall systems, ceiling tiles, floor tiles, sheet vinyl flooring, mastics, surfacing materials, Transite®, etc. Suspect materials were physically assessed for friability and evidence of damage or degradation. Samples of suspect ACM were collected for confirmation laboratory analysis. Bulk sample collection was conducted in general accordance with the sampling protocols outlined in EPA 40 CFR Part 763 Subpart E 763.86, AHERA. As part of this activity, Terracon also conducted a hazardous material assessment for the presence of UHWs consistent with the requirements of the Salt Lake County Health Department (SL Co. HD) "Solid Waste Management and Permitting Regulation No. 1." This assessment (by a Terracon inspector registered by the SL Co. HD as a Pre-demolition Building Inspector) included a visual assessment to identify and quantify the following materials:

- Mercury-containing thermostats
- Mercury-containing fluorescent light fixture lamps
- PCB-containing fluorescent light fixture ballasts or transformers
- Refrigeration units containing chlorofluorocarbons (CFCs)
- Containers of regulated liquids or hazardous waste
- Vehicle batteries, tires

The procedures and results of the survey are documented in the BMS report provided in Appendix E. Friable and Non-friable asbestos-containing materials were detected during the assessment of the building, and the survey also identified several hazardous materials that would need to be properly disposed or recycled prior to demolition. Please refer to Appendix E for the BMS report.

3.0 LABORATORY ANALYTICAL METHODS

All samples (including field duplicates) of soil, groundwater, and residual floor drain solids were placed in iced coolers. The samples were shipped in iced coolers under chain-of-custody protocols via overnight courier to Environmental Science Corporation analytical laboratory in Mt. Juliet, Tennessee (a Utah-Certified Laboratory). Samples were analyzed using the following methods:

TABLE 2 – ANALYTICAL METHOD SUMMARY

Parameter	Matrix (Solid/Liquid)	Analytical Method	No. of Samples
VOCs	Soil	SW-846 8260B	17
VOCs	Groundwater	SW-846 8260B	17
Metals (13 Priority Pollutants+Cr(VI))	Soil	SW-846 6010B, 3060A/7196A, 7471	17
Metals (13 Priority Pollutants+Cr(VI))	Groundwater	SW-846 6010B, 6020B, 6020, 7199, 7470	17
pH	Soil	SW-846 9045D	17
pH	Groundwater	Field measured	15

4.0 SUMMARY OF ANALYTICAL RESULTS

The following sections summarize analytical results for soil and groundwater relative to the comparative screening levels that were listed in the SAP. A summary of the analytical results is provided in Tables C2 through C5 (Appendix C). Copies of the ESC analytical reports and sample chain-of-custody records are provided in Appendix D.

Constituent concentrations in soils were compared to EPA Regional Screening Levels (RSLs) for residential and industrial use scenarios (June 2015), and to UDEQ Leaking Underground Storage Tank (LUST) Initial Screening Levels (ISLs) (May 15, 2006) as applicable for several VOC constituents that are typically evaluated for LUST releases. Constituent concentrations in groundwater were compared to EPA RSLs for tap water (June 2015), UDEQ-LUST ISLs (May 15, 2006), Utah Ground Water Quality Protection Standards (UGWQPS) (UAC-R317-6-2.1), EPA Maximum Contaminant Levels (MCLs), and EPA Vapor Intrusion Screening Levels (VISLs) (June 2015) for a residential exposure scenario at a target cancer risk of $1X10^{-6}$ and target hazard quotient of 1.

4.1 Soil Data Summary

VOCs A soil sample from each boring was analyzed for VOCs. Various analytes were reported at concentrations above laboratory method detection limits at

several locations across the site, but none of the reported VOC concentrations exceeded applicable screening levels.

Metals and pH All of the soil samples reported arsenic concentrations above the EPA RSL (industrial) of 3.0 mg/kg, but all the reported arsenic concentrations were within the reported background range of 3.4 to 53.9 mg/kg for soils in the Salt Lake Valley area. Hexavalent chromium concentrations in soil were reported above the EPA RSL (industrial) of 6.3 mg/kg at soil borings SE-SB-03, SE-SB-04, and SD-SB-13, and concentrations above the residential RSL (0.3 mg/kg) were reported at locations SE-SB-01, SE-SB-02, SE-SB-05, SE-SB-07, SE-SB-09, SE-SB-12, SE-SB-14 and SE-SB-15. No other metals in soil samples were detected at concentrations above the residential or industrial RSLs. The range of pH measured in all soil samples was between 7.52 and 8.89, which is considered non-hazardous and is consistent with the moderately alkaline conditions that naturally occur in soils in the Salt Lake Valley area.

4.2 Groundwater Data Summary

VOCs All groundwater samples were analyzed for VOCs. Trichloroethene (TCE) was reported at concentrations above the EPA MCL and UGWQPS (both 0.005 mg/l) at boring locations SE-SB-03, SE-SB-04, SE-SB-05, SE-SB-06, SE-SB-07, SE-SB-10, and SE-SB-11. The dissolved TCE concentrations also exceeded the EPA VISL (0.0012 mg/l) at SE-SB-03, SE-SB-04, SE-SB-05, SE-SB-06, and SE-SB-07. In the remaining groundwater samples, VOC constituents were either not detected at concentrations above the method detection limits, or were detected at concentrations below all screening levels.

Metals and pH All groundwater samples were analyzed for dissolved metals. In all of the groundwater samples, arsenic was detected at concentrations above the Tapwater RSL of 0.000052 mg/l, but none of the arsenic concentrations exceeded the MCL of 0.01 mg/l. Hexavalent chromium was detected in groundwater samples from borings SW-SB-02, SE-SB-04, SE-SB-05, SE-SB-06, SE-SB-07, and SE-SB-12. In samples from these borings, the detected (estimated J-flagged) concentrations ranged from 0.0002 to 0.0004 mg/l. These detected concentrations are above the Tapwater RSL of 0.000035 mg/l for hexavalent chromium, but three orders of magnitude below the MCL of 0.10 mg/l for total chromium. According to EPA, the MCL for total chromium is applicable to all forms of chromium including hexavalent (see EPA information *Chromium in Drinking Water* at http://www.epa.gov/dwstandardsregulations/chromium-drinking-water. Several measured groundwater pH values were also slightly below the UGWQPS of 6.5-8.5. The field-measured pH of the groundwater samples ranged from 6.29 to 6.68, which was moderately acidic and near the bottom of the range of 6.5 to 8.5 established in the UGWQPS.

5.0 DATA QUALITY ASSESSMENT

All laboratory analytical data were subject to internal reduction and validation prior to external release of the data, as detailed in the laboratory's Quality Assurance Manual. Following receipt of the laboratory analytical results by Terracon, the data were reviewed to evaluate compliance with data quality criteria as outlined in Sections D1, D2, and D3 of the QAPP.

Documentation provided with the laboratory analytical results included a case narrative; analytical data with minimum detection limits and reporting limits listed for all analyses; surrogate recoveries for GC/MS analyses with laboratory control limits; chain-of-custody records; and a quality control summary, including method blanks, matrix spike/matrix spike duplicates (MS/MSD) with control limits, laboratory control samples and duplicates (LCS/LCSD) with control limits; and application of data qualifiers where warranted.

Method blanks were run with each batch of samples, and all method blank analyte concentrations were below the laboratory reporting limits. One metal in a soil method blank (zinc) was detected at a concentration moderately above the method detection limit in one method blank batch set, but well below the laboratory reporting limit.

Nearly all MS/MSD analyses were within the laboratory control standards, with several exceptions. Sample matrix interference resulted in spike recoveries for hexavalent chromium in soil that were outside the target recovery range for accuracy, resulting in the application of J6 qualifiers as appropriate. The MS/MSD relative percent difference (RPD) for select VOCs in soil and/or groundwater (acetone, acrylonitrile, 2-chloroethyl vinyl ether, 2-butanone, 4-methyl-2-pentanone, and 1,2,3-trichloropropane) were outside the target RPD limits for precision and/or accuracy resulting in the application of J3 and J4 qualifiers, as appropriate. Matrix interference also resulted in MS/MSD spike recoveries for acetone in soil, and acrolein and 2-chloroethyl vinyl ether in groundwater that were outside recovery limits resulting in the application of J5 or J6 qualifiers, as appropriate. Substantial matrix interference was observed in one batch QC soil sample (Laboratory Sample L801435-02); however, this batch QC sample was not a site sample. For that QC batch, the method blank and LCS/LSC duplicate results show that all analytes were within the laboratory/method standards and the method was in control.

Surrogate recoveries for all GC/MS analyses were within the specified control limits. All laboratory control samples (LCS) and LCS duplicates were within the laboratory/method standards. Consistent with the QAPP, LCS spike recovery percentages that are between 85% and 115% are deemed acceptable. Although these acceptance criteria provide a general quality control goal, it should be recognized that the acceptance ranges for laboratory evaluation of spike recoveries vary considerably by analyte and by medium, and from laboratory to laboratory.

Data Quality Indicators (DQIs) were used to evaluate performance and measurement criteria in terms of Precision, Bias, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity.

Precision was evaluated on the basis of RPD as a measure of reproducibility between LCS/LCSD pairs and MS/MSD pairs (analytical precision), and between field samples and field duplicate samples (field precision). With the exceptions noted above, all laboratory duplicate RPDs were within laboratory control standards for precision. A summary of analytical results from the field duplicate pairs is provided in Tables C6 through C9 (Appendix C). With the exception of TCE in groundwater and metals in soil, most analyte concentrations in the field duplicate sets were either below method detection limits (MDLs) or were detected at estimated J-flagged concentrations below the laboratory reporting limits (LRLs). RPDs for field duplicate results were calculated only for results at or above LRLs. Terracon does not calculate RPDs for estimated J-flagged values because of the inherent uncertainty of the analyte concentrations. Consistent with the QAPP, the goal for field duplicate precision is to achieve RPD values of 20% or less when reported concentrations are $\geq$5 times the LRL, or $\pm$ the LRL when reported concentrations are <5 times the LRL. All field duplicate sample results met these precision goals, with the exception of soil results for the metals beryllium, chromium, copper, lead, nickel, zinc, and mercury. For the soil metals analyses, the duplicate sample results were consistently higher than those of the parent sample. As previously noted, spike recoveries for several analytes were outside the target control limits for accuracy, due to matrix interference. The exceedance of precision criteria for metals in soil is likely attributable to matrix interference and/or sample heterogeneity.

Bias and Accuracy were evaluated through a review of the method blanks and LCS and MS/MSD summaries provided by the laboratory. All method blank analyte concentrations were below the laboratory reporting limits. All LCS/LCS duplicate spike recoveries were within the laboratory/method standards with the exception of 2-chloroethyl vinyl ether in one soil and one groundwater batch set which were moderately higher than the recovery limits for accuracy, and J4 qualifiers were applied accordingly. With the exceptions noted above, all MS/MSD results were within the laboratory control standards for accuracy.

Representativeness is a qualitative parameter most concerned with proper design and execution of the sampling program to produce data that accurately and precisely represent environmental conditions. Selection of analytical methods, sampling methods and locations representative of the media sampled were set forth in the SAP. Representativeness in the field was achieved by implementing the approved SAP and using appropriate sampling methods, sample containers, sample handling and preservation methods. No analytes were identified in the trip blank, indicating that no VOC constituents were introduced to the samples during sample handling or transport. Representativeness in the laboratory was achieved by using the proper analytical procedures, meeting sample holding times, and analyzing and assessing laboratory QA/QC samples.

Comparability is a qualitative term expressing the confidence with which one data set can be compared to another. The comparability goal was achieved through the use of standardized sampling procedures in accordance with the SAP and QAPP, use of standardized and approved

laboratory analytical methods, and reporting the analytical results in appropriate and consistent units.

Completeness is the ratio of valid measurements to the number of planned measurements, expressed as a percentage, and the completeness goal for the project is 90%. The SAP specified collection of 15 soil samples and 15 groundwater samples, for a total of 30 samples. As discussed in Section 2.4 above, two soil samples were collected from each boring location (for VOCs and metals) at different depth intervals. The field sampling activity collected 30 soil samples and 15 groundwater samples, or a total of 45 samples. The field sample completeness is therefore 45/45 or 100%. The planned number of laboratory analyses, including VOCs, metals, and pH for the planned number of samples, was 137 and the actual number of analyses was 137; therefore the laboratory completeness is 100%. Thus, the completeness goal of 90% was achieved.

Sensitivity refers to the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest. The sensitivity goal is for MDLs to be below comparative screening levels, which vary considerably by analyte and in value and applicability. For several dissolved VOC analytes, the MDLs were above EPA Tapwater RSLs. For hexavalent chromium in soil and groundwater, the MDLs were above EPA Residential Soil RSL and the Tapwater RSL. The predominance of low and non-detect values for VOC constituents indicates a low probability that they were actually present at concentrations above residential or industrial RSLs. The prevalence of hexavalent chromium in soil and groundwater at the site suggests that lower MDLs for hexavalent chromium may show a more widespread distribution of hexavalent chromium above EPA RSLs. Overall, the level of sensitivity was sufficient to allow the identification of soil constituents above residential and industrial RSLs, and groundwater impacts above MCLs, UGWPSs, and VISLs.

The samples were collected following the procedures specified in the SAP and QAPP. All required field QA samples were collected. All samples were collected in the proper sample containers provided by the laboratory and were properly handled and packaged for shipment, and all samples arrived at the laboratory chilled, properly preserved, and labeled. Sample custody documentation was complete and accurate, and no discrepancies were found between laboratory reports and chain-of-custody documentation. All samples were analyzed within the required holding times, and all requested results were reported. The results of this data quality assessment indicate that although several reproducibility and spike recovery results were outside target QC goals or laboratory control limits, the LCS were in control for all analytical methods, and laboratory procedures were not a source of error. Data qualifiers were applied where appropriate as part of the laboratory's internal data reduction and validation process. Sample matrix interference and heterogeneity is considered to be the principal reason that some of the QC samples did not meet established goals. An overall assessment of the data, which takes into account these data quality indicators, indicates that the analytical data are acceptable for their intended use in identifying constituent concentrations above applicable screening levels.

6.0 DATA EVALUATION

Following is an overview of the identified contaminants in soil, and groundwater. The data set represents a "snapshot" of site conditions at the time of field data collection, based on the analytical results from this investigation.

6.1 Soil

The primary soil contaminant identified in this investigation was hexavalent chromium. Hexavalent chromium concentrations in soil were reported across the site in shallow soils at concentrations exceeding one or more screening levels. The highest concentrations (above the industrial EPA RSL) where reported at soil borings SE-SB-03, SE-SB-04, and SD-SB-13 which are located along the western property boundary (undeveloped open ground) and at the northeast corner (under pavement).

Arsenic concentrations in soil samples collected throughout the site are higher than the industrial RSL of 3 mg/kg, but such exceedances are common throughout the Salt Lake Valley area where background values reportedly range from 3.4 to 53.9 mg/kg (UDEQ-DERR, 1999). The arsenic concentrations reported in site soil samples ranged from 4.62 to 17.5 mg/kg. Based on these results, the reported arsenic concentrations in soil appear to be representative of natural background levels.

6.2 Groundwater

The primary contaminants identified in groundwater are TCE and hexavalent chromium. Dissolved TCE concentrations were reported above the EPA Tapwater RSL, EPA MCL and VISL in the western area of the site (SE-SB-03, SE-SB-04, SE-SB-05, SE-SB-06, and SE-SB-07) and above the EPA Tapwater RSL along the northern property boundary (SE-SB-10, and SE-SB-11). The highest concentration (0.0255 mg/l) was reported at location SE-SB-6 which is adjacent to the building near the northwest corner of the Plate Shop inside the building. These results suggest that chemical seepage from the Plate Shop may be a source of TCE contamination at the site, and that off-site activities (from the northern adjacent property) may also be impacting groundwater at the site.

Hexavalent chromium was detected in groundwater samples from the western portion of the site (SW-SB-02, SE-SB-04, SE-SB-05, SE-SB-06, SE-SB-07) and at the northern property boundary (SE-SB-12). In the samples from these borings, the detected (estimated J-flagged) concentrations of hexavalent chromium ranged from 0.0002 to 0.0004 mg/l, which is below the EPA MCL of 0.10 mg/l (for total chromium including the hexavalent form) but above the Tapwater RSL of 0.000035 mg/l. The highest detected concentration (0.0004 mg/l) was at boring SE-SB-05 located near the southwest corner of the Plate Shop. These results also suggest that seepage from the Plate Shop may have impacted groundwater at the site, but that off-site impacts to groundwater may also be migrating onto the site.

Concentrations of dissolved arsenic in groundwater are below the arsenic MCL/UGWQPS of 0.01 mg/l, although dissolved arsenic concentrations are locally higher than the tapwater RSL of 0.000052 mg/l.

Slightly acidic conditions in groundwater were observed at several locations across the site, with field-measured pH values ranging from 6.13 (near the southeast corner of the site) to 6.68 (in the north-central portion of the site).

7.0 CONCLUSIONS AND RECOMMENDATIONS

Subsurface soil types encountered beneath the site generally consisted of near-surface gravel fill materials underlain by silts and clays, which in turn were typically underlain by fine to coarse water-bearing sands. Groundwater was typically encountered during drilling at depths of approximately 10 to 12 feet bgs. Static groundwater levels measured in the three temporary piezometers ranged from approximately 10.7 to 11.8 feet below the top-of-casing elevations, which were surveyed relative to a nearby reference elevation. Based on the relative groundwater surface elevations calculated from these measurements, the groundwater flow direction at the time of the investigation was to the west-southwest, with a gradient of approximately 0.0025 feet per foot.

Identified soil impacts include hexavalent chromium concentrations above industrial and/or residential RSLs in shallow soils across the site. The highest concentrations (exceeding the industrial EPA RSL) were reported from samples collected along the western property boundary and at the northeast corner of the site (beneath pavement). The presence of hexavalent chromium in shallow soils should be addressed during planning for future site redevelopment to be protective of future users and potentially to remove a source of ongoing migration to groundwater. Current site users should be aware of the presence of hexavalent chromium in shallow soils, and take protective measures if and when these soils are disturbed or otherwise accessible for personnel exposure. Additional evaluation would be needed to delineate the depth and extent of impact. Once delineated, the primary concerns would likely be safe material (soil) management and, possibly, disposal.

Groundwater beneath the site has been impacted by TCE in the western and northwest portion of the site. The highest concentrations of dissolved TCE (above MCLs and/or VISLs) are located west of the building, with the highest concentration adjacent to the building where historical chemical seepage from the Plate Shop reportedly occurred, leaving visible staining on the exterior walls of the building. Dissolved hexavalent chromium is also present in groundwater at concentrations below the MCL but above the Tapwater RSL. The highest concentrations of dissolved hexavalent chromium appear to be highest on the western side of the property. However, both TCE and hexavalent chromium were reported at sample locations along the

northern property boundary. These results suggest that an off-site source of both VOCs and metals contamination may be present.

The current land use is commercial/industrial, not residential. Residential contaminant comparisons have been made for potential consideration of future residential Brownfield redevelopment. The VISL value used for comparison of TCE in groundwater is based on a residential exposure scenario at a target cancer risk (TCR) of $1X10^{-6}$ and target hazard quotient (THQ) of 1. Of the (residential) VISL exceedances identified in this report, two locations (SE-SB-06 and SE-SB-07) also exceeds the commercial VISL (calculated as 0.0074 mg/l using the same TCR and THQ levels). Using a calculated commercial VISL of 0.022 mg/l (as calculated for a TCR of $1X10^{-5}$ and THQ of 1) the concentration reported at SE-SB-06 (0.0255 mg/l) still exceeds the VISL. Further evaluation may be warranted to determine whether vapor intrusion is a potential concern under current commercial/industrial land use conditions.

Planning for future redevelopment in the area must take into consideration the results of this investigation. The Building Material Survey identified friable and non-friable asbestos-containing material and also identified several universal hazardous waste materials that would need to be properly disposed or recycled prior to demolition. Soils with hexavalent chromium concentrations above applicable screening levels may need to be removed and properly disposed as part of future redevelopment. The identified TCE impacts to groundwater in the western portion of the site would need to be further evaluated and addressed in a manner that is consistent with the planned future land use in the area. This could range from monitored natural attenuation to active remediation. Because of the identified exceedances of VISLs in groundwater, the potential for vapor intrusion should also be further evaluated and mitigated if necessary, consistent with other future land re-use.

In evaluating Brownfields re-use of the property, it may be appropriate to consider redevelopment-specific land use and contaminant exposures. Evaluation might consider use- and contaminant-specific risk assessments.

8.0 REFERENCES

Terracon Consultants, Inc. (Terracon)

2014 *Quality Assurance Project Plan, North Temple Brownfields Assessment, North Temple Street Corridor, Salt Lake City, Utah,* Version 5, February 18, 2014.

2015a *Phase I Environmental Site Assessment, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County,* July 1, 2015.

2015b *Sampling and Analyses Plan, North Temple Brownfields Assessment, EPA Cooperative Agreement No. 96809601, Hazardous Substance Grant for Redevelopment Agency of*

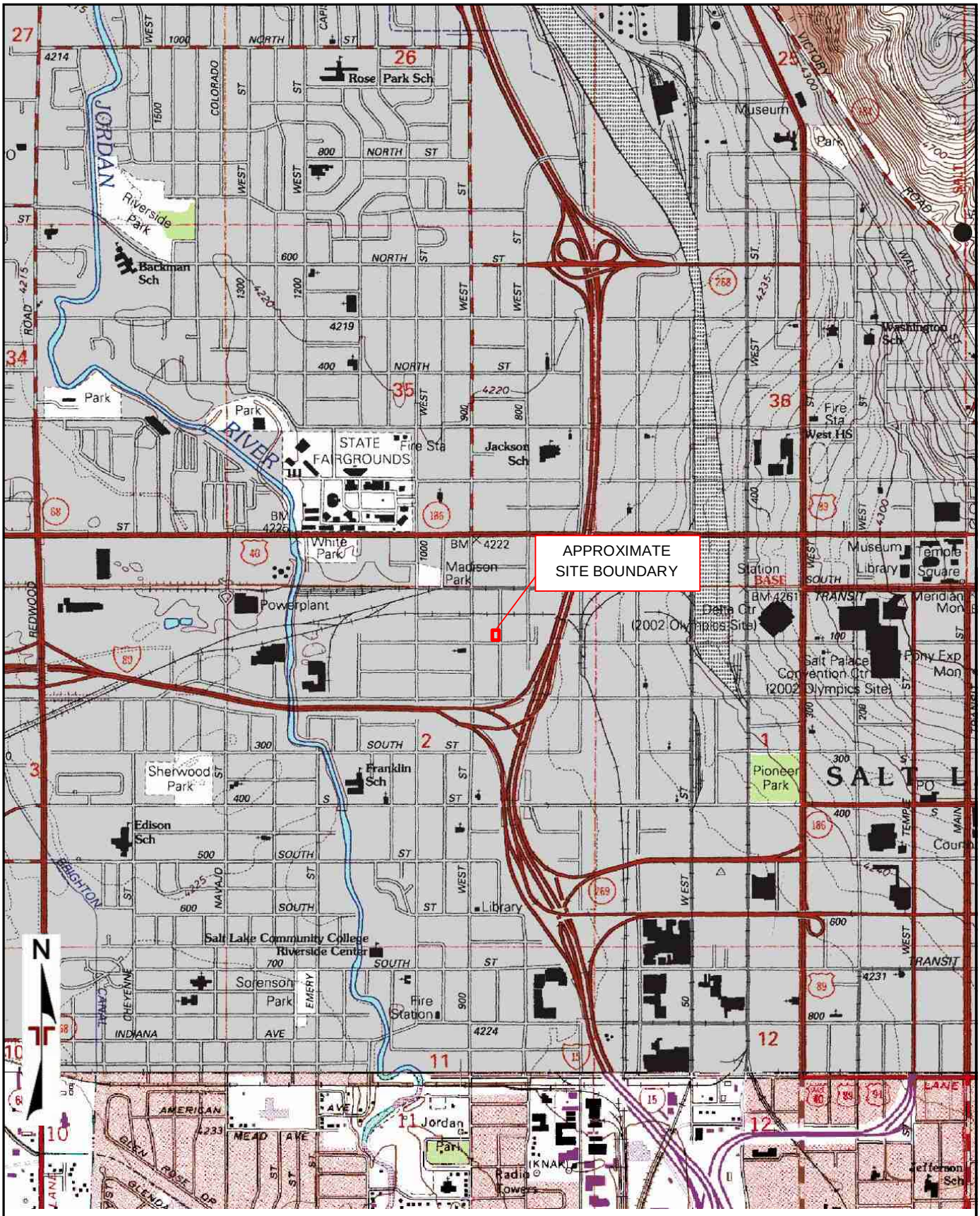
Salt Lake City – Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, October 16, 2015.

2015c *Safety and Health Plan, Brownfields Investigation, Assessment, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City,* August 12, 2015.

U.S. Environmental Protection Agency – 2015 - *Vapor Intrusion Screening Level (VISL) Calculator Version 3.4, June 2015 RSLs*

Utah Department of Environmental Quality – Division of Environmental Response & Remediation (UDEQ-DERR) – 1999 - *Inorganic Metals Background Soil Sample Data for Salt Lake Valley and Other Utah Sites,* Last Revision: February 1999.

APPENDIX A
Exhibits



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: SALT LAKE CITY NORTH, UT (1/1/1998) and SALT LAKE CITY SOUTH, UT (1/1/1999).

Project Manager: BBB	Project No. AL127481	Terracon 640 E. Wilmington Ave. Salt Lake City, UT 84106	SITE LOCATION MAP Schovaers Electronics 22 South Jeremy Street Salt Lake City, Utah
Drawn by: WWJ	Scale: 1"=24,000 SF		Exhibit 1
Checked by: ARK	File Name: Ex.1		
Approved by: ARK	Date: 5-15		

NOTES: This product is intended for informational purposes only and may not be suitable for legal, engineering, or surveying purposes.

DATA SOURCES: Aerial Photography provided by AGRC (2012 HRO).

- Boring / Piezometer Location
- Boring Location
- Past Etchant Seepage Location
- Site Boundary

N

Project No.:	AL127481-4B
Drawn By:	JK
Reviewed By:	WJ
Date:	01/06/15

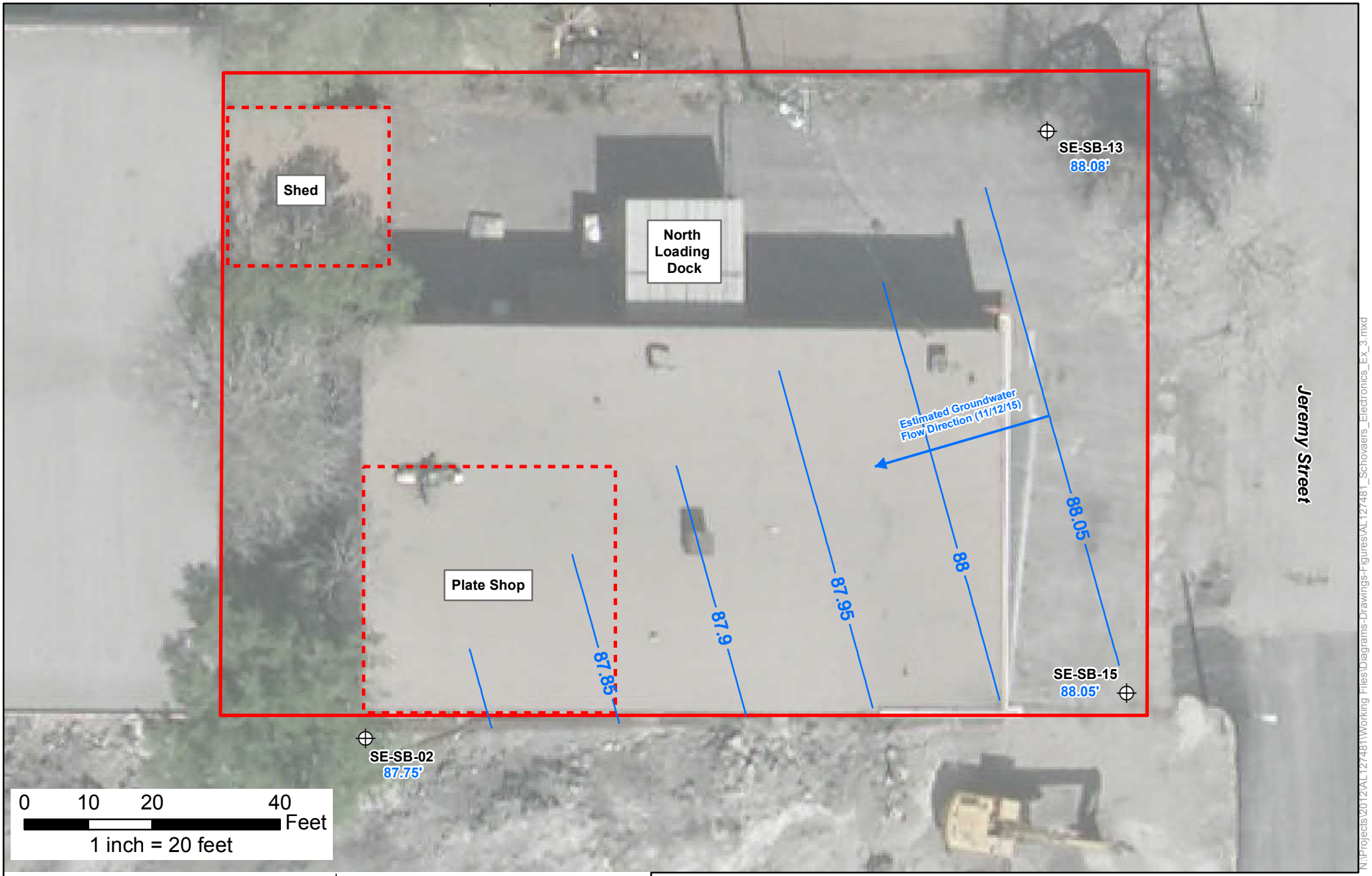
Terracon
Consulting Engineers & Scientists
6949 S. High Tech Dr. Midvale, UT 84047
PH. (801) 545-8500 terracon.com

SITE DIAGRAM

SCHOVAERS ELECTRONICS, SLC
22 South Jeremy Street
Salt Lake City, Utah

EXHIBIT

2



NOTES: This product is intended for informational purposes only and may not be suitable for legal, engineering, or surveying purposes.

DATA SOURCES: Aerial Photography provided by AGRC (2012 HRO).

Boring / Piezometer Location
Groundwater Isocontours
Site Boundary
88.08' Groundwater Elevation (feet)
Contour Interval 0.05 feet

N

Project No.:	AL127481-4B
Drawn By:	JK
Reviewed By:	WJ
Date:	01/06/15

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PIEZOMETRIC SURFACE MAP

SCHOVAERS ELECTRONICS, SLC
22 South Jeremy Street
Salt Lake City, Utah

EXHIBIT
3

N:\Projects\2012\AL127481\Working Files\Diagrams-Drawings-Figures\AL127481_Schovaers_Electronics_Ex_3.mxd

APPENDIX B
Soil Boring Logs

BORING LOG NO. SE-SB-01

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
1.0	**SANDY GRAVEL (GP)**, dark gray to gray, loose, dry					0.4	SE-SB-01 @ 1-2'
	CLAYEY SILT (CL-ML), gray to dark gray, stiff, moist				35	1.1	
		5				1.1	
7.0							
	SAND (SP), gray, loose, fine to medium grained, moist				60	0.7	
		10	▽			0.5	SE-SB-01 @ 10-11'
	-wet at 10-11'				60	0.9	
15.0		15					
	Boring Terminated at 15 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *11' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/11/2015 | Boring Completed: 11/11/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-1

BORING LOG NO. SE-SB-02

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
1.0	**SANDY GRAVEL (ROADBASE) (GP)**, loose, dry, gray					0.8	
	CLAYEY SILT (CL-ML), moist, stiff, dark gray				40	1.1	SE-SB-02 @ 1-2'
8.0		5				0.6	
	SAND (SP), moist, light gray to light brown, loose, medium to fine grained sand				75	1.9	
11.0		10				1.5	SE-SB-02 @ 10-11'
11.5	**CLAY (CL)**, gray, soft, moist						
	SAND (SP), moist, gray, loose				80	0.8	
15.0		15					
	Boring Terminated at 15 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:
Temporary piesometer set at 15' bgs.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/11/2015 | Boring Completed: 11/11/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-2

BORING LOG NO. SE-SB-03

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
1.0	**SANDY GRAVEL (GP)**, dark gray, dry, loose						
	CLAYEY SILT (CL-ML), dark brown, moist, stiff					2.0	SE-SB-03 @ 1.5-2'
					30		
						1.8	
	-color change to light brown	5				1.6	
7.0							
	SILTY SAND (SM), light brown to light gray, moist, loose, fine grained						
					75	0.6	
	-becomes sandy						
						0.8	
	-color change to brown, saturated	10	▽				SE-SB-03 @ 10-10.5'
						1.6	
13.0					60		
	SAND (SP), light gray, saturated, loose, medium grained						
						1.8	
15.0		15					
	Boring Terminated at 15 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *10' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/11/2015 | Boring Completed: 11/11/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-3

BORING LOG NO. SE-SB-04

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
	SANDY GRAVEL (GP), dark gray to dark brown, loose, dry					0.8	SE-SB-04 @ 1-2'
1.5	**CLAYEY SILT (CL-ML)**, dark brown, moist, stiff				40	1.2	
	-color change to light brown	5				0.6	
8.5	**SILTY SAND (SM)**, light brown, wet, loose, very fine grained		▽		80	1.0	
		10				1.2	SE-SB-04 @ 10-10.5'
13.0	**SAND (SP)**, saturated, loose, medium grained				50		
15.0	***Boring Terminated at 15 Feet***	15				1.4	

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *9.5' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/11/2015 | Boring Completed: 11/11/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-4

BORING LOG NO. SE-SB-05

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
1.0	**SANDY GRAVEL (GP)**, light ot dark brown, dry, loose, with organic material					0.4	
1.8	**CLAYEY SILT (CL-ML)**, dark brown, stiff, moist						
4.0	**SANDY GRAVEL (GP)**, light brown, loose, dry, with organic material				40	2.2	
7.5	**CLAYEY SILT (CL-ML)**, light brown to light gray, moist, stiff -becomes sandy	5				1.8	SE-SB-05 @ 5-6.5'
9.5	**SILTY SAND (SM)**, light brown, wet, loose, fine grained		▽		80	1.5	
13.0	**SAND (SP)**, light brown, loose, saturated, fine grained	10			75	1.8	SE-SB-05 @ 10-11'
15.0	**SAND (SP)**, light gray, loose, saturated, medium grained					1.5	
	Boring Terminated at 15 Feet	15					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:
Collected duplicate (SB-100)

WATER LEVEL OBSERVATIONS

▽ *9.5' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/11/2015 | Boring Completed: 11/11/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-5

BORING LOG NO. SE-SB-06

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
	FILL - SILTY GRAVEL (GM), dry, dark brown and light gray, loose					1.4	
2.0	**CLAYEY SILT (CL-ML)**, dark brown, stiff, moist				40		
	-color change to light brown	5				1.2	SE-SB-06 @ 5-5.5'
9.0	-becomes sandy		▽		70	1.1	
	SILTY SAND (SM), yellowish brown, saturated, very loose, fine grained	10				1.1	
	-dark staining from 13-14'				65	1.5	SE-SB-06 @ 12.5-13'
14.0	**SAND (SP)**, light gray, saturated very loose, medium grained						
15.0	***Boring Terminated at 15 Feet***	15					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *9' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/11/2015 | Boring Completed: 11/11/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-6

BORING LOG NO. SE-SB-07

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
0	**SILTY GRAVEL (GM)**, gray, loose, dray, with organic material						SE-SB-07 @ 1-2'
2.0	**CLAYEY SILT (CL-ML)**, dark gray, stiff, moist				40	1.0	
	-color change to light gray	5					
7.5	**SILTY SAND (SM)**, light brown, loose, wet, fine grained				75	1.0	
10.5	**SAND (SP)**, yellowish red, saturated, very loose, fine to medium grained	10	▽			0.8	SE-SB-07 @ 10-10.5'
	-color change to gray				75	0.7	
15.0	***Boring Terminated at 15 Feet***	15					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *10.5' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/11/2015	Boring Completed: 11/11/2015
Drill Rig: Geoprobe	Driller: DPS
Project No.: AL127481-4B	Exhibit: B-7

BORING LOG NO. SE-SB-08

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
	FILL - SANDY SILTY GRAVEL (GM), loose, dry, dark brow, with brick and other debris					0.6	SE-SB-08 @ 0.5-1.5'
1.5	**CLAYEY SILT (CL-ML)**, dark brown, stiff, moist				50		
		5				0.8	
	-color change to gray						
	-becomes sandy						
7.5	**SILTY SAND (SM)**, brown, wet, loose, very fine grained, with organic material (roots)				80	1.0	SE-SB-08 @ 9.5-10.5'
		10	▽				
11.0	**SAND (SP)**, brown, loose, saturated, medium grained, subangular, poorly sorted					0.8	
					80		
	-color change to gray					0.9	
15.0	***Boring Terminated at 15 Feet***	15					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:
Collected duplicate sample (SB-101)

WATER LEVEL OBSERVATIONS

▽ *10.75' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/12/2015 | Boring Completed: 11/12/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-8

BORING LOG NO. SE-SB-09

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
0.8	**FILL - SANDY GRAVEL (GP)**, loose, dry, dark brown, with debris					0.8	
	CLAYEY SILT (CL-ML), dark brown, stiff, moist, with possible coal fines from 1-2'					1.8	SE-SB-09 @ 1-2'
					60		
	-color change to gray	5				0.9	
6.0							
	SILTY SAND (SM), gray, loose, damp, fine grained					0.6	
8.5					60		
	SAND (SP), wet, brown, loose, with light orange staining, fine grained					0.8	
10.0		10	▽				
	SAND (SP), gray, very loose, saturated medium grained, orange staining from 10-11'					1.0	
					60		
	dark gray staining from 14-15'					1.8	SE-SB-09 @ 14-14.5'
15.0		15					
	Boring Terminated at 15 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *10' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/12/2015 | Boring Completed: 11/12/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-9

BORING LOG NO. SE-SB-10

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
	FILL - SANDY SILTY GRAVEL (GM), dark brown, loose, dry					0.8	SE-SB-10 @ 0.5-1'
1.0	**CLAYEY SILT (CL-ML)**, dark brown, stiff, moist				65	0.6	
						0.8	
	-color change to gray	5					
6.5	**SAND (SP)**, brown, loose, moist, very fine grained				90	1.0	
	-becomes saturated	10	▽			0.8	SE-SB-10 @ 8.5-9'
13.0	**SAND (SP)**, gray, loose, saturated, medium grained				60	0.6	
15.0	***Boring Terminated at 15 Feet***	15					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *9.5' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/12/2015 | Boring Completed: 11/12/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-10

BORING LOG NO. SE-SB-11

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
	FILL - SANDY GRAVEL (GP), dark brown, loose, dry, with brick and other debris					0	SE-SB-11 @ 1-2'
1.5	**CLAYEY SILT (CL-ML)**, dark brown, stiff, moist				60	0.8	
		5				1.2	
7.0	-color change to gray						
	SILTY SAND (SM), brown, loose, wet, fine grained				95	1.8	SE-SB-11 @ 9.5-10'
10.0	**SAND (SC)**, brown, very loose, saturated, medium to fine grained, mottled orange from 10-11.5'	10	▽			0.8	
					60		
	-color change to gray						
15.0						0.6	
	Boring Terminated at 15 Feet	15					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *10' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/12/2015 | Boring Completed: 11/12/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-11

BORING LOG NO. SE-SB-12

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
	FILL - SANDY GRAVEL (GP), dark brown, loose, dry, with brick and other debris present					0.6	SE-SB-12 @ 1-1.5'
1.5	**CLAYEY SILT (CL-ML)**, dark brown, stiff, moist				45	0.8	
	-color change to gray	5				0.4	
	-becomes sandy						
7.5	**SILTY SAND (SM)**, brown, loose, moist, fine grained, mottled light orange				95	1.2	
10.0	**SAND (SP)**, gray, very loose, saturated, medium grained	10	▽			0.9	SE-SB-12 @ 10-10.5'
						1.2	
					40		
15.0						0.8	
	Boring Terminated at 15 Feet	15					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *10' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/12/2015 | Boring Completed: 11/12/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-12

BORING LOG NO. SE-SB-13

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
0.4	**ASPHALT**					0.4	
1.0	**FILL - SILTY GRAVEL (GM)**, loose, dark gray, dry						SE-SB-13 @ 1-2'
	CLAYEY SILT (CL-ML), dark gray, moist, stiff				60	0.6	
4.5	**SILTY SAND (SM)**, medium dense, gray, moist, mottled brown, fine grained	5				0.8	
					25		
		10	▽			2.0	SE-SB-13 @ 10-10.5'
12.0	**SAND (SP)**, gray, wet, loose, fine grained				60	1.6	
15.0	***Boring Terminated at 15 Feet***	15					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:
Temporary piesometer set at 15' bgs.

WATER LEVEL OBSERVATIONS

▽ *10' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/11/2015	Boring Completed: 11/11/2015
Drill Rig: Geoprobe	Driller: DPS
Project No.: AL127481-4B	Exhibit: B-13

BORING LOG NO. SE-SB-14

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	RECOVERY (%)	PID (ppm)	Sample
0.5	**ASPHALT**				
1.0	**FILL - SANDY GRAVEL (GP)**, dark gray, moist, loose			2.3	SE-SB-14 @ 1-2'
	CLAYEY SILT (CL-ML), dark gray to light gray, stiff, moist		40	1.3	
		5		1.1	
6.5	**SILTY SAND (SM)**, brown to gray, loose, moist, fine grained		75	0.8	
9.8	**SAND (SP)**, brown, loose, wet, medium grained	10		1.4	SE-SB-14 @ 10-10.5'
12.0	**SAND (SP)**, gray, loose, wet, fine grained		60	0.9	
15.0	***Boring Terminated at 15 Feet***	15			

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

10' While Drilling

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/11/2015 | Boring Completed: 11/11/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-14

BORING LOG NO. SE-SB-15

PROJECT: Schovaers Electronics

CLIENT: Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

SITE: 22 South Jeremy St
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	PID (ppm)	Sample
	SANDY SILT (ML), dark brown, loose, moist						
1.0						1.9	SE-SB-15 @ 1-2'
	CLAYEY SILT (CL-ML), dry, stiff, gray				40	1.8	
		5				1.7	
7.0							
	SILTY SAND (SM), brown, medium dense, moist				60	1.1	
9.5							
	SAND (SP), gray, loose, wet, medium grained	10	▽			0.6	SE-SB-15 @ 10-10.5
					50	0.9	
15.0		15					
	Boring Terminated at 15 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Borings backfilled with bentonite chips upon completion

See Appendices for description of field procedures.

See Appendices for description of laboratory procedures and additional data (if any).

See Appendices for explanation of symbols and abbreviations.

Notes:
Temporary piezometer set at 15' bgs.

WATER LEVEL OBSERVATIONS

▽ *10' While Drilling*

Terracon
6949 S. High Tech Drive
Midvale, Utah

Boring Started: 11/11/2015 | Boring Completed: 11/11/2015

Drill Rig: Geoprobe | Driller: DPS

Project No.: AL127481-4B | Exhibit: B-15

APPENDIX C
Data Summary Tables

TABLE C1
Groundwater Elevation Measurements
Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID # 199723
Terracon Project Number AL127481-4B

Piezometer	Relative TOC[1] (ft)	Depth to Groundwater (ft) (11/12/2015)	Groundwater Elevation (ft)
SE-SB-02	99.58	11.83	87.75
SE-SB-13	99.01	10.93	88.08
SE-SB-15	98.74	10.69	88.05

TOC - Top of Casing

1 - site datum (assigned reference value of 100.00 feet) is the north bolt of the fire hydrant at the southeast corner of intersection of Jeremy Street and Folsom Avenue

TABLE C2
Volatile Organic Compounds (VOCs) in Soil
Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID # 199723
Terracon Project Number AL127481-4B

				Lab Sample ID	L800774-03		L800774-06		L800774-09		L800774-12		L800774-15		L800774-18		L800774-21		L800774-24		L800774-27		L800774-30		L800774-33		L800774-36		L800774-39		L800774-42		L800774-45					
				Client Sample ID	SE-SB-01 10-10.5 FT		SE-SB-02 10-10.5 FT		SE-SB-03 10-10.5 FT		SE-SB-04 10-10.5 FT		SE-SB-05 10-11.5 FT		SE-SB-06 12.5-13 FT		SE-SB-07 10-10.5 FT		SE-SB-08 9.5-10.5 FT		SE-SB-09 14-14.5 FT		SE-SB-10 8.5-9 FT		SE-SB-11 9.5-10 FT		SE-SB-12 10-10.5 FT		SE-SB-13 10-10.5 FT		SE-SB-14 10-10.5 FT		SE-SB-15 10-10.5 FT					
				Date Collected	11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/12/2015		11/12/2015		11/12/2015		11/12/2015		11/12/2015		11/11/2015		11/11/2015		11/11/2015					
Analyte (Method 8260B)	**CAS**	**RSL Residential (mg/kg)**	**RSL Industrial (mg/kg)**	***Utah ISLs (mg/kg)***	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**
ACETONE	67-64-1	61000	670000	NE	<0.05		<0.05		<0.05		<0.05	J3, J5	<0.05		<0.05		<0.05		<0.05		<0.05		<0.05		<0.05		<0.05		<0.05		<0.05		<0.05		<0.05		<0.05	
ACRYLONITRILE	107-13-1	0.25	1.1	NE	<0.00895		<0.00895		<0.00895		<0.00895	J3	<0.00895		<0.00895		<0.00895		<0.00895		<0.00895		<0.00895		<0.00895		<0.00895		<0.00895		<0.00895		<0.00895		<0.00895		<0.00895	
BENZENE	71-43-2	1.2	5.1	0.2	<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135		<0.00135	
BROMOBENZENE	108-86-1	290	1800	NE	<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142		<0.00142	
BROMODICHLOROMETHANE	75-27-4	0.29	1.3	NE	<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127		<0.00127	
BROMOFORM	75-25-2	19	86	NE	<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212		<0.00212	
BROMOMETHANE	74-83-9	6.8	30	NE	<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067		<0.0067	
N-BUTYLBENZENE	104-51-8	3900	58000	NE	<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129		<0.00129	
SEC-BUTYLBENZENE	135-98-8	7800	120000	NE	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	
TERT-BUTYLBENZENE	98-06-6	7800	120000	NE	<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103	
CARBON TETRACHLORIDE	56-23-5	0.65	2.9	NE	<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164		<0.00164	
CHLOROBENZENE	108-90-7	280	1300	NE	<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106	
CHLORODIBROMOMETHANE	124-48-1	0.75	3.3	NE	<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186	
CHLOROETHANE	75-00-3	14000	57000	NE	<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473		<0.00473	
2-CHLOROETHYL VINYL ETHER	110-75-8	NE	NE	NE	<0.0117	J4	<0.0117		<0.0117		<0.0117		<0.0117		<0.0117		<0.0117		<0.0117	J4	<0.0117	J4	<0.0117		<0.0117		<0.0117		<0.0117		<0.0117		<0.0117		<0.0117		<0.0117	
CHLOROFORM	67-66-3	0.32	1.4	NE	<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114		<0.00114	
CHLOROMETHANE	74-87-3	110	460	NE	<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188		<0.00188	
2-CHLOROTOLUENE	95-49-8	1600	23000	NE	<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015		<0.0015	
4-CHLOROTOLUENE	106-43-4	1600	23000	NE	<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012	
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	0.0053	0.064	NE	<0.00525		<0.00525		<0.00525		<0.00525	J3	<0.00525		<0.00525		<0.00525		<0.00525		<0.00525		<0.00525		<0.00525		<0.00525		<0.00525		<0.00525		<0.00525		<0.00525		<0.00525	
1,2-DIBROMOETHANE	106-93-4	0.036	0.16	NE	<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172		<0.00172	
DIBROMOMETHANE	74-95-3	23	98	NE	<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191	
1,2-DICHLOROBENZENE	95-50-1	1800	9300	NE	<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152	
1,3-DICHLOROBENZENE	541-73-1	NE	NE	NE	<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012		<0.0012	
1,4-DICHLOROBENZENE	106-46-7	2.6	11	NE	<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113		<0.00113	
DICHLORODIFLUOROMETHANE	75-71-8	87	370	NE	<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356		<0.00356	
1,1-DICHLOROETHANE	75-34-3	3.6	16	NE	<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995		<0.000995	
1,2-DICHLOROETHANE	107-06-2	0.46	2	NE	<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132	
1,1-DICHLOROETHENE	75-35-4	230	1000	NE	<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152		<0.00152	
CIS-1,2-DICHLOROETHENE	156-59-2	160	2300	NE	<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118		<0.00118	
TRANS-1,2-DICHLOROETHENE	156-60-5	1600	23000	NE	<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132	
1,2-DICHLOROPROPANE	78-87-5	1	4.4	NE	<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179		<0.00179	
1,1-DICHLOROPROPENE	563-58-6	NE	NE	NE	<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158		<0.00158	
1,3-DICHLOROPROPANE	142-28-9	1600	23000	NE	<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104		<0.00104	
CIS-1,3-DICHLOROPROPENE	10061-01-5	NE	NE	NE	<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131		<0.00131	
TRANS-1,3-DICHLOROPROPENE	10061-02-6	NE	NE	NE	<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134		<0.00134	
2,2-DICHLOROPROPANE	594-20-7	NE	NE	NE	<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014	
DI-ISOPROPYL ETHER	108-20-3	2200	9400	NE	<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124		<0.00124	
ETHYLBENZENE	100-41-4	5.8	25	5	<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148		<0.00148	
HEXACHLORO-1,3-BUTADIENE	87-68-3	1.2	5.3	NE	<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171		<0.00171	
ISOPROPYLBENZENE	98-82-8	1900	9900	NE	<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122		<0.00122	
P-ISOPROPYLTOLUENE	99-87-6	NE	NE	NE	<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102		<0.00102	
1,4-DIOXANE	123-91-1	5.3	24	NE	<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186		<0.00186	
2-BUTANONE (MEK)	78-93-3	27000	190000	NE	<0.0234		<0.0234		<0.0234		<0.0234	J3	<0.0234		<0.0234		<0.0234		<0.0234		<0.0234		<0.0234		<0.0234		<0.0234		<0.0234		<0.0234		<0.0234		<0.0234		<0.0234		<0.0234	
METHYLENE CHLORIDE	75-09-2	57	1000	NE	0.0073	J	<0.005		<0.005		<0.005		<0.005		<0.005		<0.005		0.0063	J	0.00703	J	<0.005		<0.005		<0.005		<0.005		<0.005		<0.005		<0.005		<0.005		<0.005	
4-METHYL-2-PENTANONE (MIBK)	108-10-1	5300	56000	NE	<0.0094		<0.0094		<0.0094		<0.0094	J3	<0.0094		<0.0094		<0.0094		<0.0094		<0.0094		<0.0094		<0.0094		<0.0094		<0.0094		<0.0094		<0.0094		<0.0094		<0.0094		<0.0094	
METHYL TERT-BUTYL ETHER	1634-04-4	47	210	0.3	<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106	
NAPHTHALENE	91-20-3	3.8	17	51	<0.005		<0.005		<0.005		<0.005		<0.005		*<0.005*		<0.005		<0.005		<0.005		<0.005		<0.005		<0.005		<0.005		<0.005		<0.005		<0.005		<0.005	
N-PROPYLBENZENE	103-65-1	3800	24000	NE	<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103		<0.00103	
STYRENE	100-42-5	6000	35000	NE	<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117		<0.00117	
1,1,1,2-TETRACHLOROETHANE	630-20-6	2	8.8	NE	<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132		<0.00132	
1,1,2,2-TETRACHLOROETHANE	79-34-5	0.6	2.7	NE	<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182	
1,1,2-TRICHLOROTRIFLUOROETHANE	76-13-1	40000	170000	NE	<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182		<0.00182	
TETRACHLOROETHENE	127-18-4	24	100	NE	<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138	
TOLUENE	108-88-3	4900	47000	9	<0.00217		<0.00217		<0.00217		<0.00217		<0.00217		*<0.00217*		<0.00217		<0.00217		<0.00217		<0.00217		<0.00217		<0.00217		<0.00217		<0.00217		<0.00217		<0.00217		<0.00217	
1,2,3-TRICHLOROBENZENE	87-61-6	63	930	NE	<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153		<0.00153	
1,2,4-TRICHLOROBENZENE	120-82-1	24	110	NE	<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194		<0.00194	
1,1,1-TRICHLOROETHANE	71-55-6	8100	36000	NE	<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143		<0.00143	
1,1,2-TRICHLOROETHANE	79-00-5	1.1	5	NE	<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138		<0.00138	
TRICHLOROETHENE	79-01-6	0.94	6	NE	<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		0.00545	J	<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014	
TRICHLOROFLUOROMETHANE	75-69-4	730	3100	NE	<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191		<0.00191	
1,2,3-TRICHLOROPROPANE	96-18-4	0.0051	0.11	NE	<0.0037		<0.0037		<0.0037		<0.0037	J3	<0.0037		<0.0037		<0.0037		<0.0037		<0.0037		<0.0037		<0.0037		<0.0037		<0.0037		<0.0037		<0.0037		<0.0037		<0.0037	
1,2,4-TRIMETHYLBENZENE	95-63-6	58	240	NE	0.00153	J	<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		0.00164	J	<0.00106		<0.00106		0.00198	J	<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106	
1,2,3-TRIMETHYLBENZENE	526-73-8	49	210	NE	<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144		<0.00144	
1,3,5-TRIMETHYLBENZENE	108-67-8	780	12000	NE	<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133	
VINYL CHLORIDE	75-01-4	0.059	1.7	NE	<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146		<0.00146	
XYLENES, TOTAL	1330-20-7	650	2800	142	<0.00349		<0.00349		<0.00349		<0.00349		<0.00349		<0.00349		<0.00349		0.00615	J	<0.00349		<0.00349		<0.00349		<0.00349		<0.00349		<0.00349		<0.00349		<0.00349		<0.00349	

CAS - Chemical Abstracts Service
RSL - EPA Region 9 Regional Screening Level (June 2015)
ISL - Initial Screening Level (Utah Department of Environmental Quality/Division of Environmental Response & Remediation)
< : Less than the analytical method detection limit
mg/kg - milligrams per kilogram
NE - None Established
Green Shading: exceeds Residential RSL
Red Shading: exceeds Industrial RSL
Italicized: exceeds ISL

Q: Data Qualifiers -
J: The identification of the analyte is acceptable; the reported value is an estimate.
J3: The associated batch QC was outside the established quality control range for precision.
J4: The associated batch QC was outside the established quality control range for accuracy.
J5: The sample matrix interfered with the ability to make any accurate determination; spike value is high.

TABLE C3
Volatile Organic Compounds (VOCs) in Groundwater
Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID # 199723
Terracon Project Number AL127481-4B

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TABLE C4
Metals in Soil
Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID # 199723
Terracon Project Number AL127481-4B

					Lab Sample ID		L800774-02		L800774-05		L800774-08		L800774-11		L800774-14		L800774-17		L800774-20		L800774-23		L800774-26		L800774-29		L800774-32		L800774-35		L800774-38		L800774-41		L800774-44	
					Client Sample ID		SE-SB-01 1- 2FT		SE-SB-02 1-2 FT		SE-SB-03 1.5-2 FT		SE-SB-04 1-2 FT		SE-SB-05 5-6.5 FT		SE-SB-06 5-5.5 FT		SE-SB-07 1-2 FT		SE-SB-08 0.5-1.5 F		SE-SB-09 1-2 FT		SE-SB-10 0.5-1 FT		SE-SB-11 1-1.5 FT		SE-SB-12 1-1.5 FT		SE-SB-13 1-2 FT		SE-SB-14 1-2 FT		SE-SB-15 1-2 FT	
					Date Collected		11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/12/2015		11/12/2015		11/12/2015		11/12/2015		11/12/2015		11/11/2015		11/11/2015		11/11/2015	
Analyte	**Method**	**CAS**	**RSL Residential (mg/kg)**	**RSL Industrial (mg/kg)**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**	**Result (mg/kg)**	**Q**
CHROMIUM,HEXAVALENT	3060A/7196A	18540-29-9	0.3	6.3	1.71	J	3.25		11.3		18.4	J6	1.13	J	<0.64		4.14		<0.64		0.993	J	<0.64		<0.64		1.75	J	7.18		2.65		1.76	J
ANTIMONY	6020	7440-36-0	31	470	<0.75		<0.75		<0.75		1.82	J	<0.75		<0.75		<0.75		1.93	J	<0.75		1.27	J	0.897	J	<0.75		<0.75		<0.75		<0.75	
ARSENIC	6020	7440-38-2	0.68	3	4.62		8.77		8.47		8.33		17.5		10		16.5		15.2		12.4		15.1		11.8		10.1		7.1		5.87		5.05	
BERYLLIUM	6020	7440-41-7	160	2300	1.11		0.761		0.851		0.641		0.742		0.228	J	0.887		1.46		0.525		0.561		0.427		0.493		1.09		0.616		0.86	
CADMIUM	6020	7440-43-9	71	980	0.285	J	0.736		0.251	J	0.87		0.181	J	0.403	J	0.0943	J	0.408	J	0.481	J	1.52		1.05		0.761		0.657		0.426	J	0.435	J
CHROMIUM	6020	7440-47-3	120000	1800000	13.4		13		8.71		13.8		13.7		5.96		14.8		6.66		11.6		16.4		8.48		10.5		22.2		11.1		13.2	
COPPER	6020	7440-50-8	3100	47000	56.6		48.4		39.6		44.5		37.3		19.6		58.6		49.8		22.2		48.7		42.3		53.3		43.6		41		55.2	
LEAD	6020	7439-92-1	400	800	36.7		127		45.2		129		41.7		14.5		31.7		194		56		252		290		140		44		45.2		41.1	
NICKEL	6020	7440-02-0	1500	22000	16.2		14.5		14		13.2		16.1		5.45		23.5		5.63		10.2		17.4		7.36		10.6		26.9		15.2		16.1	
SELENIUM	6020	7782-49-2	390	5800	<0.74		<0.74		<0.74		<0.74		1.27	J	<0.74		1.4	J	<0.74		<0.74		<0.74		<0.74		<0.74		<0.74		<0.74		<0.74	
SILVER	6020	7440-22-4	390	5800	<0.28		<0.28		<0.28		4.11		<0.28		<0.28		<0.28		<0.28		<0.28		<0.28		<0.28		<0.28		<0.28		<0.28		<0.28	
THALLIUM	6020	7440-28-0	0.78	12	<0.65		<0.65		<0.65		<0.65		<0.65		<0.65		<0.65		<0.65		<0.65		<0.65		<0.65		<0.65		<0.65		<0.65		<0.65	
ZINC	6020	7440-66-6	23000	350000	86.3		97.6		61.6		138		80.4		27.1		91.6		92.7		71		209		182		118		109		64		72.7	
MERCURY	7471A	7439-97-6	9.4	40	0.025	J	0.18		0.025		0.171		0.0186	J	0.0213	J	0.116		0.414		0.142		0.971		1.84		0.386		0.057		0.044		0.0144	J
pH	9045D	NE	NE	NE	8.41		7.83		7.52		8.2		8.06		8.28		8.17		8.6		8.5		8.22		8.47		8.89		8.13		8.83		8.31	

CAS - Chemical Abstracts Service
RSL - EPA Region 9 Regional Screening Level (June 2015)
< : Less than the analytical method detection limit
mg/kg - milligrams per kilogram
NE - None Established
Green Shading: exceeds Residential RSL
Red Shading: exceeds Industrial RSL

Q: Data Qualifiers -
J: The identification of the analyte is acceptable; the reported value is an estimate.
J6: The sample matrix interfered with the ability to make any accurate determination; spike value is low.

TABLE C5
Dissolved Metals in Groundwater
Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID # 199723
Terracon Project Number AL127481-4B

					Lab Sample ID	L800774-01		L800774-04		L800774-07		L800774-10		L800774-13		L800774-16		L800774-19		L800774-22		L800774-25		L800774-28		L800774-31		L800774-34		L800774-37		L800774-40		L800774-43			
					Client Sample ID	SE-SB-01		SE-SB-02		SE-SB-03		SE-SB-04		SE-SB-05		SE-SB-06		SE-SB-07		SE-SB-08		SE-SB-09		SE-SB-10		SE-SB-11		SE-SB-12		SE-SB-13		SE-SB-14		SE-SB-15			
					Date Collected	11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/11/2015		11/12/2015		11/12/2015		11/12/2015		11/12/2015		11/12/2015		11/11/2015		11/11/2015		11/11/2015			
Analyte	**Method**	**CAS**	**EPA Tapwater RSL (mg/l)**	**EPA MCL (mg/l)**	**UGWQPS (mg/l)**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**	**Result (mg/l)**	**Q**
CHROMIUM,HEXAVALENT	7199	18540-29-9	0.000035	NE	NE	<0.00015		0.0002	J	<0.00015		0.0002	J	0.0004	J	0.0002	J	0.0003	J	<0.00015		<0.00015		<0.00015		<0.00015		0.0002	J	<0.00015		<0.00015		<0.00015			
ANTIMONY	6020	7440-36-0	0.0078	0.006	0.006	0.000748	J	0.00483		0.00094	J	<0.00021		0.000916	J	0.00124	J	0.000543	J	<0.00021		0.000371	J	0.000457	J	0.000477	J	0.000279	J	0.00112	J	0.000428	J	0.000991	J		
ARSENIC	6020	7440-38-2	0.000052	0.01	0.05	0.00383		0.00526		0.0015	J	0.00158	J	0.00182	J	0.00203		0.00147	J	0.000981	J	0.00712		0.000928	J	0.00405		0.0013	J	0.00418		0.00191	J	0.00175	J		
BERYLLIUM	6010B	7440-41-7	0.025	0.004	0.004	<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007			
CADMIUM	6010B	7440-43-9	0.0092	0.005	0.005	<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007		<0.0007			
CHROMIUM [1]	6010B	7440-47-3	22	0.1	0.1	<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014		<0.0014			
COPPER	6010B	7440-50-8	0.8	1.3	1.3	<0.0053		<0.0053		<0.0053		<0.0053		<0.0053		<0.0053		<0.0053		<0.0053		<0.0053		<0.0053		<0.0053		<0.0053		<0.0053		<0.0053		<0.0053			
LEAD	6020	7439-92-1	0.015	0.015	0.015	0.000251	J	0.000313	J	<0.00024		<0.00024		<0.00024		<0.00024		<0.00024		<0.00024		0.000402	J	0.000263	J	<0.00024		0.00026	J	0.000274	J	0.000255	J	<0.00024			
NICKEL [2]	6010B	7440-02-0	0.2	NE	NE	0.00566	J	0.00702	J	0.00556	J	<0.0049		0.00539	J	0.00819	J	0.00718	J	<0.0049		<0.0049		0.00752	J	0.00577	J	<0.0049		<0.0049		<0.0049		<0.0049			
SELENIUM	6010B	7782-49-2	0.1	0.05	0.05	<0.0074		<0.0074		0.0101		<0.0074		<0.0074		<0.0074		<0.0074		<0.0074		<0.0074		<0.0074		<0.0074		<0.0074		<0.0074		<0.0074		<0.0074			
SILVER	6010B	7440-22-4	0.094	NE	0.1	<0.0028		<0.0028		<0.0028		<0.0028		<0.0028		<0.0028		<0.0028		<0.0028		<0.0028		<0.0028		<0.0028		<0.0028		<0.0028		<0.0028		<0.0028			
THALLIUM	6020	7440-28-0	0.0002	0.002	0.002	<0.00019		<0.00019		<0.00019		<0.00019		<0.00019		<0.00019		<0.00019		<0.00019		<0.00019		<0.00019		<0.00019		<0.00019		<0.00019		<0.00019		<0.00019			
ZINC	6010B	7440-66-6	6	NE	5	0.0141	J	0.0168	J	<0.0059		<0.0059		<0.0059		<0.0059		<0.0059		<0.0059		<0.0059		<0.0059		<0.0059		<0.0059		0.00704	J	<0.0059		<0.0059			
MERCURY	7470A	7439-97-6	0.00063	0.002	0.002	<0.000049		<0.000049		<0.000049		0.0000493	J	<0.000049		<0.000049		<0.000049		<0.000049		<0.000049		<0.000049		<0.000049		<0.000049		<0.000049		<0.000049		<0.000049			
pH	FM	NE	NE	NE	6.5-8.5	6.41		6.51		6.29		6.31		6.36		6.49		6.66		6.44		6.43		6.41		6.65		6.68		6.31		6.35		6.13			

CAS - Chemical Abstracts Service
RSL - EPA Region 9 Regional Screening Level (June 2015)
1 - EPA Tapwater RSL is for Chromium III (soluble Salts)
2 - EPA Tapwater RSL is for Nickel Oxide
MCL - EPA Maximum Contaminant Level
UGWQPS - Utah Ground Water Quality Protection Standard (UAC R317-6-2.1)
< : Less than the analytical method detection limit
mg/l - milligrams per liter
NE - None Established
FM - Field Measured (standard pH units)
Green Shading: exceeds Tapwater RSL
Red Shading: exceeds MCL
Underlined: exceeds UGWQPS

Q: Data Qualifiers -
J: The identification of the analyte is acceptable; the reported value is an estimate.

TABLE C6
Duplicate Sample Comparisons - Volatile Organic Compounds (VOCs) in Soil
Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID # 199723
Terracon Project Number AL127481-4B

	Duplicate Pair					Duplicate Pair				
Lab Sample ID	L800774-15		L800774-48			L800774-24		L800774-51		
Client Sample ID	SE-SB-05 10-11.5 FT		SE-SB-100 10-11.5 FT			SE-SB-08 9.5-10.5 FT		SE-SB-101 9.5-10.5 FT		
Date Collected	11/11/2015		11/11/2015			11/12/2015		11/12/2015		
Analyte (Method 8260B)	**Result** (mg/kg)	**Q**	**Result** (mg/kg)	**Q**	**RPD**	**Result** (mg/kg)	**Q**	**Result** (mg/kg)	**Q**	**RPD**
ACETONE	<0.05		<0.05			<0.05		<0.05		
ACRYLONITRILE	<0.00895		<0.00895			<0.00895		<0.00895		
BENZENE	<0.00135		<0.00135			<0.00135		<0.00135		
BROMOBENZENE	<0.00142		<0.00142			<0.00142		<0.00142		
BROMODICHLOROMETHANE	<0.00127		<0.00127			<0.00127		<0.00127		
BROMOFORM	<0.00212		<0.00212			<0.00212		<0.00212		
BROMOMETHANE	<0.0067		<0.0067			<0.0067		<0.0067		
N-BUTYLBENZENE	<0.00129		<0.00129			<0.00129		<0.00129		
SEC-BUTYLBENZENE	<0.001		<0.001			<0.001		<0.001		
TERT-BUTYLBENZENE	<0.00103		<0.00103			<0.00103		<0.00103		
CARBON TETRACHLORIDE	<0.00164		<0.00164			<0.00164		<0.00164		
CHLOROBENZENE	<0.00106		<0.00106			<0.00106		<0.00106		
CHLORODIBROMOMETHANE	<0.00186		<0.00186			<0.00186		<0.00186		
CHLOROETHANE	<0.00473		<0.00473			<0.00473		<0.00473		
2-CHLOROETHYL VINYL ETHER	<0.0117		<0.0117			<0.0117	J4	<0.0117		
CHLOROFORM	<0.00114		<0.00114			<0.00114		<0.00114		
CHLOROMETHANE	<0.00188		<0.00188			<0.00188		<0.00188		
2-CHLOROTOLUENE	<0.0015		<0.0015			<0.0015		<0.0015		
4-CHLOROTOLUENE	<0.0012		<0.0012			<0.0012		<0.0012		
1,2-DIBROMO-3-CHLOROPROPANE	<0.00525		<0.00525			<0.00525		<0.00525		
1,2-DIBROMOETHANE	<0.00172		<0.00172			<0.00172		<0.00172		
DIBROMOMETHANE	<0.00191		<0.00191			<0.00191		<0.00191		
1,2-DICHLOROBENZENE	<0.00152		<0.00152			<0.00152		<0.00152		
1,3-DICHLOROBENZENE	<0.0012		<0.0012			<0.0012		<0.0012		
1,4-DICHLOROBENZENE	<0.00113		<0.00113			<0.00113		<0.00113		
DICHLORODIFLUOROMETHANE	<0.00356		<0.00356			<0.00356		<0.00356		
1,1-DICHLOROETHANE	<0.000995		<0.000995			<0.000995		<0.000995		
1,2-DICHLOROETHANE	<0.00132		<0.00132			<0.00132		<0.00132		
1,1-DICHLOROETHENE	<0.00152		<0.00152			<0.00152		<0.00152		
CIS-1,2-DICHLOROETHENE	<0.00118		<0.00118			<0.00118		<0.00118		
TRANS-1,2-DICHLOROETHENE	<0.00132		<0.00132			<0.00132		<0.00132		
1,2-DICHLOROPROPANE	<0.00179		<0.00179			<0.00179		<0.00179		
1,1-DICHLOROPROPENE	<0.00158		<0.00158			<0.00158		<0.00158		
1,3-DICHLOROPROPANE	<0.00104		<0.00104			<0.00104		<0.00104		
CIS-1,3-DICHLOROPROPENE	<0.00131		<0.00131			<0.00131		<0.00131		
TRANS-1,3-DICHLOROPROPENE	<0.00134		<0.00134			<0.00134		<0.00134		
2,2-DICHLOROPROPANE	<0.0014		<0.0014			<0.0014		<0.0014		
DI-ISOPROPYL ETHER	<0.00124		<0.00124			<0.00124		<0.00124		
ETHYLBENZENE	<0.00148		<0.00148			<0.00148		<0.00148		
HEXACHLORO-1,3-BUTADIENE	<0.00171		<0.00171			<0.00171		<0.00171		
ISOPROPYLBENZENE	<0.00122		<0.00122			<0.00122		<0.00122		
P-ISOPROPYLTOLUENE	<0.00102		<0.00102			<0.00102		<0.00102		
1,4-DIOXANE	<0.00186		<0.00186			<0.00186		<0.00186		
2-BUTANONE (MEK)	<0.0234		<0.0234			<0.0234		<0.0234		
METHYLENE CHLORIDE	<0.005		<0.005			0.0063	J	<0.005		
4-METHYL-2-PENTANONE (MIBK)	<0.0094		<0.0094			<0.0094		<0.0094		
METHYL TERT-BUTYL ETHER	<0.00106		<0.00106			<0.00106		<0.00106		
NAPHTHALENE	<0.005		<0.005			<0.005		<0.005		
N-PROPYLBENZENE	<0.00103		<0.00103			<0.00103		<0.00103		
STYRENE	<0.00117		<0.00117			<0.00117		<0.00117		
1,1,1,2-TETRACHLOROETHANE	<0.00132		<0.00132			<0.00132		<0.00132		
1,1,2,2-TETRACHLOROETHANE	<0.00182		<0.00182			<0.00182		<0.00182		
1,1,2-TRICHLOROTRIFLUOROETHANE	<0.00182		<0.00182			<0.00182		<0.00182		
TETRACHLOROETHENE	<0.00138		<0.00138			<0.00138		<0.00138		
TOLUENE	<0.00217		<0.00217			<0.00217		<0.00217		
1,2,3-TRICHLOROBENZENE	<0.00153		<0.00153			<0.00153		<0.00153		
1,2,4-TRICHLOROBENZENE	<0.00194		<0.00194			<0.00194		<0.00194		
1,1,1-TRICHLOROETHANE	<0.00143		<0.00143			<0.00143		<0.00143		
1,1,2-TRICHLOROETHANE	<0.00138		<0.00138			<0.00138		<0.00138		
TRICHLOROETHENE	<0.0014		<0.0014			<0.0014		<0.0014		
TRICHLOROFLUOROMETHANE	<0.00191		<0.00191			<0.00191		<0.00191		
1,2,3-TRICHLOROPROPANE	<0.0037		<0.0037			<0.0037		<0.0037		
1,2,4-TRIMETHYLBENZENE	<0.00106		<0.00106			0.00164	J	<0.00106		
1,2,3-TRIMETHYLBENZENE	<0.00144		<0.00144			<0.00144		<0.00144		
1,3,5-TRIMETHYLBENZENE	<0.00133		<0.00133			<0.00133		<0.00133		
VINYL CHLORIDE	<0.00146		<0.00146			<0.00146		<0.00146		
XYLENES, TOTAL	<0.00349		<0.00349			0.00615	J	<0.00349		

RPD - Relative Percent Difference
< : Less than the analytical method detection limit
mg/kg - milligrams per kilogram
Q: Data Qualifiers -
J: The identification of the analyte is acceptable; the reported value is an estimate.
J4: The associated batch QC was outside the established quality control range for accuracy.

TABLE C7
Duplicate Sample Comparisons - Volatile Organic Compounds (VOCs) in Groundwater
Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID # 199723
Terracon Project Number AL127481-4B

	Duplicate Pair					Duplicate Pair				
Lab Sample ID	L800774-13		L800774-46			L800774-22		L800774-49		
Client Sample ID	SE-SB-05		SE-SB-100			SE-SB-08		SE-SB-101		
Date Collected	11/11/2015		11/11/2015			11/12/2015		11/12/2015		
Analyte (Method 8260B)	**Result** (mg/l)	**Q**	**Result** (mg/l)	**Q**	**RPD**	**Result** (mg/l)	**Q**	**Result** (mg/l)	**Q**	**RPD**
ACETONE	<0.01		<0.01			<0.01		<0.01		
ACROLEIN	<0.00887		<0.00887			<0.00887		<0.00887		
ACRYLONITRILE	<0.00187		<0.00187			<0.00187		<0.00187		
BENZENE	<0.000331		<0.000331			<0.000331		<0.000331		
BROMOBENZENE	<0.000352		<0.000352			<0.000352		<0.000352		
BROMODICHLOROMETHANE	<0.00038		<0.00038			<0.00038		<0.00038		
BROMOFORM	<0.000469		<0.000469			<0.000469		<0.000469		
BROMOMETHANE	<0.000866		<0.000866			<0.000866		<0.000866		
N-BUTYLBENZENE	<0.000361		<0.000361			<0.000361		<0.000361		
SEC-BUTYLBENZENE	<0.000365		<0.000365			<0.000365		<0.000365		
TERT-BUTYLBENZENE	<0.000399		<0.000399			<0.000399		<0.000399		
CARBON TETRACHLORIDE	<0.000379		<0.000379			<0.000379		<0.000379		
CHLOROBENZENE	<0.000348		<0.000348			<0.000348		<0.000348		
CHLORODIBROMOMETHANE	<0.000327		<0.000327			<0.000327		<0.000327		
CHLOROETHANE	<0.000453		<0.000453			<0.000453		<0.000453		
2-CHLOROETHYL VINYL ETHER	<0.00301		<0.00301			<0.00301		<0.00301		
CHLOROFORM	<0.000324		<0.000324			<0.000324		<0.000324		
CHLOROMETHANE	<0.000276		<0.000276			<0.000276		<0.000276		
2-CHLOROTOLUENE	<0.000375		<0.000375			<0.000375		<0.000375		
4-CHLOROTOLUENE	<0.000351		<0.000351			<0.000351		<0.000351		
1,2-DIBROMO-3-CHLOROPROPANE	<0.00133		<0.00133			<0.00133		<0.00133		
1,2-DIBROMOETHANE	<0.000381		<0.000381			<0.000381		<0.000381		
DIBROMOMETHANE	<0.000346		<0.000346			<0.000346		<0.000346		
1,2-DICHLOROBENZENE	<0.000349		<0.000349			<0.000349		<0.000349		
1,3-DICHLOROBENZENE	<0.00022		<0.00022			<0.00022		<0.00022		
1,4-DICHLOROBENZENE	<0.000274		<0.000274			<0.000274		<0.000274		
DICHLORODIFLUOROMETHANE	<0.000551		<0.000551			<0.000551		<0.000551		
1,1-DICHLOROETHANE	<0.000259		<0.000259			<0.000259		<0.000259		
1,2-DICHLOROETHANE	<0.000361		<0.000361			<0.000361		<0.000361		
1,1-DICHLOROETHENE	<0.000398		<0.000398			<0.000398		<0.000398		
CIS-1,2-DICHLOROETHENE	<0.00026		<0.00026			<0.00026		<0.00026		
TRANS-1,2-DICHLOROETHENE	<0.000396		<0.000396			<0.000396		<0.000396		
1,2-DICHLOROPROPANE	<0.000306		<0.000306			<0.000306		<0.000306		
1,1-DICHLOROPROPENE	<0.000352		<0.000352			<0.000352		<0.000352		
1,3-DICHLOROPROPANE	<0.000366		<0.000366			<0.000366		<0.000366		
CIS-1,3-DICHLOROPROPENE	<0.000418		<0.000418			<0.000418		<0.000418		
TRANS-1,3-DICHLOROPROPENE	<0.000419		<0.000419			<0.000419		<0.000419		
2,2-DICHLOROPROPANE	<0.000321		<0.000321			<0.000321		<0.000321		
DI-ISOPROPYL ETHER	<0.00032		<0.00032			<0.00032		<0.00032		
ETHYLBENZENE	<0.000384		<0.000384			<0.000384		<0.000384		
HEXACHLORO-1,3-BUTADIENE	<0.000256		<0.000256			<0.000256		<0.000256		
ISOPROPYLBENZENE	<0.000326		<0.000326			<0.000326		<0.000326		
P-ISOPROPYLTOLUENE	<0.00035		<0.00035			<0.00035		<0.00035		
1,4-DIOXANE	<0.000597		<0.000597			<0.000597		<0.000597		
2-BUTANONE (MEK)	<0.00393		<0.00393			<0.00393		<0.00393		
METHYLENE CHLORIDE	<0.001		<0.001			<0.001		<0.001		
4-METHYL-2-PENTANONE (MIBK)	<0.00214		<0.00214			<0.00214		<0.00214		
METHYL TERT-BUTYL ETHER	<0.000367		<0.000367			<0.000367		<0.000367		
NAPHTHALENE	<0.001		<0.001			<0.001		<0.001		
N-PROPYLBENZENE	<0.000349		<0.000349			<0.000349		<0.000349		
STYRENE	<0.000307		<0.000307			<0.000307		<0.000307		
1,1,1,2-TETRACHLOROETHANE	<0.000385		<0.000385			<0.000385		<0.000385		
1,1,2,2-TETRACHLOROETHANE	<0.00013		<0.00013			<0.00013		<0.00013		
1,1,2-TRICHLOROTRIFLUOROETHANE	<0.000303		<0.000303			<0.000303		<0.000303		
TETRACHLOROETHENE	<0.000372		<0.000372			<0.000372		<0.000372		
TOLUENE	<0.00078		<0.00078			<0.00078		<0.00078		
1,2,3-TRICHLOROBENZENE	<0.00023		<0.00023			<0.00023		<0.00023		
1,2,4-TRICHLOROBENZENE	<0.000355		<0.000355			<0.000355		<0.000355		
1,1,1-TRICHLOROETHANE	<0.000319		<0.000319			<0.000319		<0.000319		
1,1,2-TRICHLOROETHANE	<0.000383		<0.000383			<0.000383		<0.000383		
TRICHLOROETHENE	0.00739		0.00719		2.7	<0.000398		<0.000398		
TRICHLOROFLUOROMETHANE	<0.0012		<0.0012			<0.0012		<0.0012		
1,2,3-TRICHLOROPROPANE	<0.000807		<0.000807			<0.000807		<0.000807		
1,2,4-TRIMETHYLBENZENE	<0.000373		<0.000373			<0.000373		<0.000373		
1,2,3-TRIMETHYLBENZENE	<0.000321		<0.000321			<0.000321		<0.000321		
1,3,5-TRIMETHYLBENZENE	<0.000387		<0.000387			<0.000387		<0.000387		
VINYL CHLORIDE	<0.000259		<0.000259			<0.000259		<0.000259		
XYLENES, TOTAL	<0.00106		<0.00106			<0.00106		<0.00106		

RPD - Relative Percent Difference
< : Less than the analytical method detection limit
mg/l - milligrams per liter

TABLE C8
Duplicate Sample Comparisons - Metals in Soil
Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID # 199723
Terracon Project Number AL127481-4B

	Duplicate Pair					Duplicate Pair				
Lab Sample ID	L800774-14		L800774-47			L800774-23		L800774-50		
Client Sample ID	SE-SB-05 5-6.5 FT		SE-SB-100 5-6.5 FT			SE-SB-08 0.5-1.5 FT		SE-SB-101 0.5-1.5 FT		
Date Collected	11/11/2015		11/11/2015			11/12/2015		11/12/2015		
Analyte	**Result** (mg/kg)	**Q**	**Result** (mg/kg)	**Q**	**RPD**	**Result** (mg/kg)	**Q**	**Result** (mg/kg)	**Q**	**RPD**
CHROMIUM,HEXAVALENT	1.13	J	2.06	J		<0.64		3.42	J6	
ANTIMONY	<0.75		<0.75			1.93	J	1.42	J	
ARSENIC	17.5		17.8		1.70	15.2		12.6		18.71
BERYLLIUM	0.742		0.641		14.61	1.46		0.527		93.91
CADMIUM	0.181	J	0.593	J		0.408	J	0.537	J	
CHROMIUM	13.7		14.1		2.88	6.66		12.7		62.40
COPPER	37.3		44.6		17.83	49.8		34.7		35.74
LEAD	41.7		79.8		62.72	194		230		16.98
NICKEL	16.1		13.7		16.11	5.63		7.59		29.65
SELENIUM	1.27	J	<0.74			<0.74		<0.74		
SILVER	<0.28		<0.28			<0.28		0.373	J	
THALLIUM	<0.65		<0.65			<0.65		<0.65		
ZINC	80.4		121		40.32	92.7		134		36.44
MERCURY	0.0186	J	0.301			0.414		4.33		165.09

< : Less than the analytical method detection limit
mg/kg - milligrams per kilogram
Q: Data Qualifiers -
J: The identification of the analyte is acceptable; the reported value is an estimate.
J6: The sample matrix interfered with the ability to make any accurate determination; spike value is low.

TABLE C9
Duplicate Sample Comparisions - Dissolved Metals in Groundwater
Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID # 199723
Terracon Project Number AL127481-4B

	Duplicate Pair					Duplicate Pair				
Lab Sample ID	L800774-13		L800774-46			L800774-22		L800774-49		
Client Sample ID	SE-SB-05		SE-SB-100			SE-SB-08		SE-SB-101		
Date Collected	11/11/2015		11/11/2015			11/12/2015		11/12/2015		
Analyte	**Result** (mg/l)	**Q**	**Result** (mg/l)	**Q**	**RPD**	**Result** (mg/l)	**Q**	**Result** (mg/l)	**Q**	**RPD**
CHROMIUM,HEXAVALENT	0.0004	J	<0.00015			<0.00015		<0.00015		
ANTIMONY	0.000916	J	0.000819	J		<0.00021		<0.00021		
ARSENIC	0.00182	J	0.0016	J		0.000981	J	0.000941	J	
BERYLLIUM	<0.0007		<0.0007			<0.0007		<0.0007		
CADMIUM	<0.0007		<0.0007			<0.0007		<0.0007		
CHROMIUM	<0.0014		<0.0014			<0.0014		0.0014	J	
COPPER	<0.0053		<0.0053			<0.0053		<0.0053		
LEAD	<0.00024		<0.00024			<0.00024		<0.00024		
NICKEL	0.00539	J	<0.0049			<0.0049		0.005	J	
SELENIUM	<0.0074		<0.0074			<0.0074		<0.0074		
SILVER	<0.0028		<0.0028			<0.0028		<0.0028		
THALLIUM	<0.00019		<0.00019			<0.00019		<0.00019		
ZINC	<0.0059		<0.0059			<0.0059		<0.0059		
MERCURY	<0.000049		<0.000049			<0.000049		<0.000049		

< : Less than the analytical method detection limit
mg/l - milligrams per liter
Q: Data Qualifiers -
J: The identification of the analyte is acceptable; the reported value is an estimate.

APPENDIX D
Chain of Custody and Laboratory Data Sheets

ANALYTICAL REPORT

November 30, 2015

Terracon - Salt Lake City, UT

Sample Delivery Group:	L800774
Samples Received:	11/13/2015
Project Number:	AL127481-4B
Description:	Schovaers Electronics

Report To: Wynn John
640 E Wilmington Avenue
Salt Lake City, UT 84106

Entire Report Reviewed By:

Daphne R Richards

Daphne Richards
Technical Service Representative

SE-SB-01 L800774-01 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 11:22
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:18	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:12	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/19/15 23:32	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829041	1	11/16/15 14:04	11/16/15 14:04	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 13:26	11/18/15 13:26	MCG

SE-SB-01 1- 2FT L800774-02 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 10:41
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 12:56	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 15:03	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:20	CCE
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:00	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG828921	1	11/16/15 10:35	11/17/15 09:18	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-01 10-10.5 FT L800774-03 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 10:52
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:00	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG830459	5	11/20/15 01:25	11/20/15 08:38	ACG

SE-SB-02 L800774-04 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 10:20
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:25	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:00	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 00:35	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 07:11	11/15/15 07:11	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 13:34	11/18/15 13:34	MCG

SE-SB-02 1-2 FT L800774-05 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 10:05
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:03	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 15:43	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:23	CCE
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:01	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG828921	1	11/16/15 10:35	11/17/15 09:20	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-02 10-10.5 FT L800774-06 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 10:16
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:01	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829033	5	11/14/15 04:02	11/17/15 01:37	BMB

SE-SB-03 L800774-07 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 12:38
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:31	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:15	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 00:37	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 07:32	11/15/15 07:32	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 14:21	11/18/15 14:21	MCG

SE-SB-03 1.5-2 FT L800774-08 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 12:19
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:06	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 15:46	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:32	CCE
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:01	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG828921	1	11/16/15 10:35	11/17/15 09:22	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-03 10-10.5 FT L800774-09 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 12:29
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:01	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829033	5	11/14/15 04:02	11/17/15 02:01	BMB

SE-SB-04 L800774-10 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:46
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:34	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:18	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 00:40	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 07:52	11/15/15 07:52	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 14:40	11/18/15 14:40	MCG

SE-SB-04 1-2 FT L800774-11 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:31
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:09	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 15:49	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:35	CCE
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:01	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM

SE-SB-04 1-2 FT L800774-11 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:31
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 3060A/7196A	WG828921	1	11/16/15 10:35	11/17/15 09:24	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-04 10-10.5 FT L800774-12 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:41
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:02	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829033	5	11/14/15 04:02	11/17/15 02:26	BMB

SE-SB-05 L800774-13 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:18
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:36	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:27	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 00:42	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 08:13	11/15/15 08:13	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 14:49	11/18/15 14:49	MCG

SE-SB-05 5-6.5 FT L800774-14 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 13:50
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:11	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 15:52	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:38	CCE
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:02	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG828921	1	11/16/15 10:35	11/17/15 09:30	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-05 10-11.5 FT L800774-15 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 13:55
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:02	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829033	5	11/14/15 04:02	11/17/15 02:50	BMB

SE-SB-06 L800774-16 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 15:29
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:38	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:30	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 00:44	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 08:34	11/15/15 08:34	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 14:57	11/18/15 14:57	MCG

SE-SB-06 5-5.5 FT L800774-17 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 15:14
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:14	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 15:56	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:42	CCE
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:55	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG828921	1	11/16/15 10:35	11/17/15 09:30	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-06 12.5-13 FT L800774-18 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 15:19
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:55	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829033	5	11/14/15 04:02	11/17/15 03:14	BMB

SE-SB-07 L800774-19 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 15:51
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:40	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:33	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 00:47	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 08:54	11/15/15 08:54	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 15:05	11/18/15 15:05	MCG

SE-SB-07 1-2 FT L800774-20 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 15:59
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:16	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 15:59	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:45	CCE
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:56	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG828921	1	11/16/15 10:35	11/17/15 09:31	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-07 10-10.5 FT L800774-21 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 16:12
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:56	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829033	5	11/14/15 04:02	11/17/15 03:38	BMB

SE-SB-08 L800774-22 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:00
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:42	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:36	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 00:49	LAT

SE-SB-08 L800774-22 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:00
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 09:15	11/15/15 09:15	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 15:13	11/18/15 15:13	MCG

SE-SB-08 0.5-1.5 FT L800774-23 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 09:41
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:19	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 16:02	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:48	CCE
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:56	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG828921	1	11/16/15 10:35	11/17/15 09:32	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-08 9.5-10.5 FT L800774-24 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 09:45
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:56	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG830459	5	11/20/15 01:25	11/20/15 08:58	ACG

SE-SB-09 L800774-25 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:48
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:45	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:39	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 00:56	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 09:35	11/15/15 09:35	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 15:21	11/18/15 15:21	MCG

SE-SB-09 1-2 FT L800774-26 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:37
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:27	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 16:05	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:51	CCE
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:56	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG828921	1	11/16/15 10:35	11/17/15 09:33	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-09 14-14.5 FT L800774-27 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:46
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:57	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG830459	5	11/20/15 01:25	11/20/15 11:34	ACG

SE-SB-10 L800774-28 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 09:28
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:47	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:42	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 00:59	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 09:56	11/15/15 09:56	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 15:30	11/18/15 15:30	MCG

SE-SB-10 0.5-1 FT L800774-29 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 09:12
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:29	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 16:17	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:54	CCE
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:57	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG830384	1	11/19/15 17:10	11/20/15 08:26	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-10 8.5-9 FT L800774-30 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 09:17
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:57	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829033	5	11/14/15 04:02	11/17/15 04:50	BMB

SE-SB-11 L800774-31 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:30
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:49	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:45	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 01:01	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 10:17	11/15/15 10:17	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 15:38	11/18/15 15:38	MCG

SE-SB-11 1-1.5 FT L800774-32 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:12
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	2	11/14/15 11:45	11/16/15 14:05	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 16:20	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:57	CCE
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:27	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG830384	1	11/19/15 17:10	11/20/15 08:28	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-11 9.5-10 FT L800774-33 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:17
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:27	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829527	5	11/17/15 07:06	11/17/15 09:07	ACG

SE-SB-12 L800774-34 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 11:12
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:51	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:48	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 01:04	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 10:38	11/15/15 10:38	BMB
Wet Chemistry by Method 7199	WG829647	1	11/18/15 15:46	11/18/15 15:46	MCG

SE-SB-12 1-1.5 FT L800774-35 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 11:02
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:34	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 16:23	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 13:00	CCE
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:28	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG830384	1	11/19/15 17:10	11/20/15 08:30	SJM
Wet Chemistry by Method 9045D	WG828925	1	11/14/15 11:16	11/14/15 11:16	SJM

SE-SB-12 10-10.5 FT L800774-36 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 11:09
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:28	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829034	5	11/14/15 04:03	11/16/15 09:22	ACG

SE-SB-13 L800774-37 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 09:00
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 11:58	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:51	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 01:06	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 10:59	11/15/15 10:59	BMB
Wet Chemistry by Method 7199	WG831270	1	11/24/15 05:40	11/24/15 05:40	MCG

SE-SB-13 1-2 FT L800774-38 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 08:40
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:37	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 16:26	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 13:09	CCE
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:28	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM

SE-SB-13 1-2 FT L800774-38 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 08:40
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 3060A/7196A	WG830384	1	11/19/15 17:10	11/20/15 08:32	SJM
Wet Chemistry by Method 9045D	WG828928	1	11/14/15 10:41	11/14/15 10:41	SJM

SE-SB-13 10-10.5 FT L800774-39 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 08:51
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:28	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829527	5	11/17/15 07:06	11/17/15 09:27	ACG

SE-SB-14 L800774-40 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 11:51
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 12:00	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 22:54	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 01:08	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 11:19	11/15/15 11:19	BMB
Wet Chemistry by Method 7199	WG831270	1	11/24/15 06:05	11/24/15 06:05	MCG

SE-SB-14 1-2 FT L800774-41 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 11:30
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:40	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 16:30	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 13:12	CCE
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:29	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG830384	1	11/19/15 17:10	11/20/15 08:38	SJM
Wet Chemistry by Method 9045D	WG828928	1	11/14/15 10:41	11/14/15 10:41	SJM

SE-SB-14 10-10.5 FT L800774-42 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 11:37
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:29	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829034	5	11/14/15 04:03	11/16/15 10:01	ACG

SE-SB-15 L800774-43 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 09:35
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 12:02	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 23:03	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 01:11	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 11:39	11/15/15 11:39	BMB
Wet Chemistry by Method 7199	WG831270	1	11/24/15 06:13	11/24/15 06:13	MCG

SE-SB-15 1-2 FT L800774-44 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 09:21
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:42	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 16:36	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 13:15	CCE
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:29	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG830384	1	11/19/15 17:10	11/20/15 08:41	SJM
Wet Chemistry by Method 9045D	WG828928	1	11/14/15 10:41	11/14/15 10:41	SJM

SE-SB-15 10-10.5 FT L800774-45 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 09:31
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:30	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829034	5	11/14/15 04:03	11/16/15 10:20	ACG

SE-SB-100 L800774-46 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:29
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 12:05	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 23:06	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 01:13	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 12:00	11/15/15 12:00	BMB
Wet Chemistry by Method 7199	WG831270	1	11/24/15 06:29	11/24/15 06:29	MCG

SE-SB-100 5-6.5 FT L800774-47 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:29
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	1	11/14/15 11:45	11/16/15 13:45	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 16:39	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 13:19	CCE
Total Solids by Method 2540 G-2011	WG829024	1	11/13/15 20:19	11/14/15 15:23	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG830384	1	11/19/15 17:10	11/20/15 08:45	SJM
Wet Chemistry by Method 9045D	WG828928	1	11/14/15 10:41	11/14/15 10:41	SJM

SE-SB-100 10-11.5 FT L800774-48 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:29
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829024	1	11/13/15 20:19	11/14/15 15:24	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829034	5	11/14/15 04:03	11/16/15 08:44	ACG

SE-SB-101 L800774-49 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:05
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG828922	1	11/16/15 15:27	11/17/15 12:07	BRJ
Metals (ICP) by Method 6010B	WG829919	1	11/18/15 15:30	11/18/15 23:09	CCE
Metals (ICPMS) by Method 6020	WG829833	1	11/18/15 15:08	11/20/15 01:15	LAT

SE-SB-101 L800774-49 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:05
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829042	1	11/15/15 12:21	11/15/15 12:21	BMB
Wet Chemistry by Method 7199	WG831270	1	11/24/15 06:54	11/24/15 06:54	MCG

SE-SB-101 0.5-1.5 FT L800774-50 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:05
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG828916	10	11/14/15 11:45	11/16/15 14:08	BRJ
Metals (ICP) by Method 6010B	WG829835	1	11/19/15 19:05	11/20/15 16:42	WBD
Metals (ICP) by Method 6010B	WG830710	1	11/25/15 08:37	11/25/15 12:05	CCE
Total Solids by Method 2540 G-2011	WG829024	1	11/13/15 20:19	11/14/15 15:24	MEL
Wet Chemistry by Method 2580 B-2011	WG829427	1	11/17/15 15:11	11/17/15 17:06	SAM
Wet Chemistry by Method 3060A/7196A	WG830384	1	11/19/15 17:10	11/20/15 08:48	SJM
Wet Chemistry by Method 9045D	WG828928	1	11/14/15 10:41	11/14/15 10:41	SJM

SE-SB-101 9.5-10.5 FT L800774-51 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:05
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829024	1	11/13/15 20:19	11/14/15 15:24	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG829527	5	11/17/15 07:06	11/17/15 09:46	ACG

TRIP BLANK L800774-52 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 00:00
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG830448	1	11/20/15 12:06	11/20/15 12:06	BMB

SE-SB-01 L800774-53 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 11:22
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 17:01	11/24/15 17:01	ACG

SE-SB-01 10-10.5 FT L800774-54 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 10:52
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:00	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 17:21	JHH

SE-SB-02 L800774-55 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 10:20
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 17:21	11/24/15 17:21	ACG

SE-SB-02 10-10.5 FT L800774-56 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 10:16
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:01	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 17:41	JHH

SE-SB-03 L800774-57 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 12:38
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 17:40	11/24/15 17:40	ACG

SE-SB-03 10-10.5 FT L800774-58 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 12:29
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:01	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 18:01	JHH

SE-SB-04 L800774-59 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:46
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 18:00	11/24/15 18:00	ACG

SE-SB-04 10-10.5 FT L800774-60 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:41
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:02	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 18:20	JHH

SE-SB-05 L800774-61 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 14:18
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 18:19	11/24/15 18:19	ACG

SE-SB-05 10-11.5 FT L800774-62 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 13:55
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829020	1	11/15/15 10:15	11/16/15 09:02	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 18:40	JHH

SE-SB-06 L800774-63 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 15:29
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 18:39	11/24/15 18:39	ACG

SE-SB-06 12.5-13 FT L800774-64 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 15:19
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:55	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 18:59	JHH

SE-SB-07 L800774-65 GW

Collected by: WJ / DJ
Collected date/time: 11/11/15 15:51
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 18:58	11/24/15 18:58	ACG

SE-SB-07 10-10.5 FT L800774-66 Solid

Collected by: WJ / DJ
Collected date/time: 11/11/15 16:12
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:56	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 19:19	JHH

SE-SB-08 L800774-67 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:00
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831359	1	11/25/15 10:02	11/25/15 10:02	ACG

SE-SB-08 9.5-10.5 FT L800774-68 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 09:45
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:56	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 21:56	JHH

SE-SB-09 L800774-69 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:48
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831359	1	11/25/15 10:21	11/25/15 10:21	ACG

SE-SB-09 14-14.5 FT L800774-70 Solid

Collected by: WJ / DJ
Collected date/time: 11/12/15 10:46
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:57	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 22:15	JHH

SE-SB-10 L800774-71 GW

Collected by: WJ / DJ
Collected date/time: 11/12/15 09:28
Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831359	1	11/25/15 10:41	11/25/15 10:41	ACG

SE-SB-10 8.5-9 FT L800774-72 Solid

Collected by: WJ / DJ | Collected date/time: 11/12/15 09:17 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829021	1	11/15/15 10:03	11/16/15 08:57	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 22:35	JHH

SE-SB-11 L800774-73 GW

Collected by: WJ / DJ | Collected date/time: 11/12/15 10:30 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831359	1	11/25/15 11:00	11/25/15 11:00	ACG

SE-SB-11 9.5-10 FT L800774-74 Solid

Collected by: WJ / DJ | Collected date/time: 11/12/15 10:17 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:27	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 22:55	JHH

SE-SB-12 L800774-75 GW

Collected by: WJ / DJ | Collected date/time: 11/12/15 11:12 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831359	1	11/25/15 11:20	11/25/15 11:20	ACG

SE-SB-12 10-10.5 FT L800774-76 Solid

Collected by: WJ / DJ | Collected date/time: 11/12/15 11:09 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:28	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 23:15	JHH

SE-SB-13 L800774-77 GW

Collected by: WJ / DJ | Collected date/time: 11/11/15 09:00 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 19:18	11/24/15 19:18	ACG

SE-SB-13 10-10.5 FT L800774-78 Solid

Collected by: WJ / DJ | Collected date/time: 11/11/15 08:51 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:28	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 19:39	JHH

SE-SB-14 L800774-79 GW

Collected by: WJ / DJ | Collected date/time: 11/11/15 11:51 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 19:37	11/24/15 19:37	ACG

SE-SB-14 10-10.5FT L800774-80 Solid

Collected by: WJ / DJ | Collected date/time: 11/11/15 11:37 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:29	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 19:58	JHH

SE-SB-15 L800774-81 GW

Collected by: WJ / DJ | Collected date/time: 11/11/15 09:35 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 19:57	11/24/15 19:57	ACG

SE-SB-15 10-10.5 FT L800774-82 Solid

Collected by: WJ / DJ | Collected date/time: 11/11/15 09:31 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829023	1	11/13/15 21:03	11/14/15 15:30	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 20:17	JHH

SE-SB-100 L800774-83 GW

Collected by: WJ / DJ | Collected date/time: 11/11/15 14:29 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831352	1	11/24/15 20:16	11/24/15 20:16	ACG

SE-SB-100 10-11.5 FT L800774-84 Solid

Collected by: WJ / DJ | Collected date/time: 11/11/15 14:29 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829024	1	11/13/15 20:19	11/14/15 15:24	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 20:37	JHH

SE-SB-101 L800774-85 GW

Collected by: WJ / DJ | Collected date/time: 11/12/15 10:05 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831359	1	11/25/15 11:39	11/25/15 11:39	ACG

SE-SB-1019.5-10.5 FT L800774-86 Solid

Collected by: WJ / DJ | Collected date/time: 11/12/15 10:05 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG829024	1	11/13/15 20:19	11/14/15 15:24	MEL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831367	5	11/24/15 10:57	11/25/15 23:34	JHH

TRIP BLANK L800774-87 GW

Collected by: WJ / DJ | Collected date/time: 11/12/15 00:00 | Received date/time: 11/13/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG831359	1	11/25/15 14:06	11/25/15 14:06	ACG

All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne R Richards

Daphne Richards
Technical Service Representative

Sample Handling and Receiving

The following analysis were performed from an unpreserved, insufficiently or inadequately preserved sample.

ESC Sample ID	Project Sample ID	Method
L800774-10	SE-SB-04	7199
L800774-13	SE-SB-05	7199
L800774-19	SE-SB-07	7199
L800774-37	SE-SB-13	7199
L800774-40	SE-SB-14	7199

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/18/2015 13:26	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:18	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:12	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:12	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:12	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:12	WG829919
Nickel,Dissolved	0.00566	J	0.00490	0.0100	1	11/18/2015 22:12	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:12	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:12	WG829919
Zinc,Dissolved	0.0141	J	0.00590	0.0500	1	11/18/2015 22:12	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000748	J	0.000210	0.00200	1	11/19/2015 23:32	WG829833
Arsenic,Dissolved	0.00383		0.000250	0.00200	1	11/19/2015 23:32	WG829833
Lead,Dissolved	0.000251	J	0.000240	0.00200	1	11/19/2015 23:32	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/19/2015 23:32	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/16/2015 14:04	WG829041
Acrolein	U		0.00887	0.0500	1	11/16/2015 14:04	WG829041
Acrylonitrile	U		0.00187	0.0100	1	11/16/2015 14:04	WG829041
Benzene	U		0.000331	0.00100	1	11/16/2015 14:04	WG829041
Bromobenzene	U		0.000352	0.00100	1	11/16/2015 14:04	WG829041
Bromodichloromethane	U		0.000380	0.00100	1	11/16/2015 14:04	WG829041
Bromoform	U		0.000469	0.00100	1	11/16/2015 14:04	WG829041
Bromomethane	U		0.000866	0.00500	1	11/16/2015 14:04	WG829041
n-Butylbenzene	U		0.000361	0.00100	1	11/16/2015 14:04	WG829041
sec-Butylbenzene	U		0.000365	0.00100	1	11/16/2015 14:04	WG829041
tert-Butylbenzene	U		0.000399	0.00100	1	11/16/2015 14:04	WG829041
Carbon tetrachloride	U		0.000379	0.00100	1	11/16/2015 14:04	WG829041
Chlorobenzene	U		0.000348	0.00100	1	11/16/2015 14:04	WG829041
Chlorodibromomethane	U		0.000327	0.00100	1	11/16/2015 14:04	WG829041
Chloroethane	U		0.000453	0.00500	1	11/16/2015 14:04	WG829041
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/16/2015 14:04	WG829041
Chloroform	U		0.000324	0.00500	1	11/16/2015 14:04	WG829041
Chloromethane	U		0.000276	0.00250	1	11/16/2015 14:04	WG829041
2-Chlorotoluene	U		0.000375	0.00100	1	11/16/2015 14:04	WG829041
4-Chlorotoluene	U		0.000351	0.00100	1	11/16/2015 14:04	WG829041
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/16/2015 14:04	WG829041
1,2-Dibromoethane	U		0.000381	0.00100	1	11/16/2015 14:04	WG829041
Dibromomethane	U		0.000346	0.00100	1	11/16/2015 14:04	WG829041
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/16/2015 14:04	WG829041

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/16/2015 14:04	WG829041
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/16/2015 14:04	WG829041
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/16/2015 14:04	WG829041
1,1-Dichloroethane	U		0.000259	0.00100	1	11/16/2015 14:04	WG829041
1,2-Dichloroethane	U		0.000361	0.00100	1	11/16/2015 14:04	WG829041
1,1-Dichloroethene	U		0.000398	0.00100	1	11/16/2015 14:04	WG829041
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/16/2015 14:04	WG829041
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/16/2015 14:04	WG829041
1,2-Dichloropropane	U		0.000306	0.00100	1	11/16/2015 14:04	WG829041
1,1-Dichloropropene	U		0.000352	0.00100	1	11/16/2015 14:04	WG829041
1,3-Dichloropropane	U		0.000366	0.00100	1	11/16/2015 14:04	WG829041
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/16/2015 14:04	WG829041
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/16/2015 14:04	WG829041
2,2-Dichloropropane	U		0.000321	0.00100	1	11/16/2015 14:04	WG829041
Di-isopropyl ether	U		0.000320	0.00100	1	11/16/2015 14:04	WG829041
Ethylbenzene	U		0.000384	0.00100	1	11/16/2015 14:04	WG829041
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/16/2015 14:04	WG829041
Isopropylbenzene	U		0.000326	0.00100	1	11/16/2015 14:04	WG829041
p-Isopropyltoluene	U		0.000350	0.00100	1	11/16/2015 14:04	WG829041
2-Butanone (MEK)	U		0.00393	0.0100	1	11/16/2015 14:04	WG829041
Methylene Chloride	U		0.00100	0.00500	1	11/16/2015 14:04	WG829041
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/16/2015 14:04	WG829041
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/16/2015 14:04	WG829041
Naphthalene	U		0.00100	0.00500	1	11/16/2015 14:04	WG829041
n-Propylbenzene	U		0.000349	0.00100	1	11/16/2015 14:04	WG829041
Styrene	U		0.000307	0.00100	1	11/16/2015 14:04	WG829041
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/16/2015 14:04	WG829041
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/16/2015 14:04	WG829041
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/16/2015 14:04	WG829041
Tetrachloroethene	U		0.000372	0.00100	1	11/16/2015 14:04	WG829041
Toluene	U		0.000780	0.00500	1	11/16/2015 14:04	WG829041
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/16/2015 14:04	WG829041
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/16/2015 14:04	WG829041
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/16/2015 14:04	WG829041
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/16/2015 14:04	WG829041
Trichloroethene	U		0.000398	0.00100	1	11/16/2015 14:04	WG829041
Trichlorofluoromethane	U		0.00120	0.00500	1	11/16/2015 14:04	WG829041
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/16/2015 14:04	WG829041
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/16/2015 14:04	WG829041
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/16/2015 14:04	WG829041
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/16/2015 14:04	WG829041
Vinyl chloride	U		0.000259	0.00100	1	11/16/2015 14:04	WG829041
Xylenes, Total	U		0.00106	0.00300	1	11/16/2015 14:04	WG829041
(S) Toluene-d8	*109*			*90.0-115*		*11/16/2015 14:04*	WG829041
(S) Dibromofluoromethane	*108*			*79.0-121*		*11/16/2015 14:04*	WG829041
(S) 4-Bromofluorobenzene	*108*			*80.1-120*		*11/16/2015 14:04*	WG829041

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	77.3		1	11/16/2015 09:00	WG829020

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	148		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	1.71	J	0.640	2.59	1	11/17/2015 09:18	WG828921

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.41		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-02 WG828925: 8.41 at 22.4c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0250	J	0.00280	0.0259	1	11/16/2015 12:56	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.59	1	11/20/2015 15:03	WG829835
Arsenic	4.62		0.650	2.59	1	11/25/2015 12:20	WG830710
Beryllium	1.11		0.0700	0.259	1	11/20/2015 15:03	WG829835
Cadmium	0.285	J	0.0700	0.647	1	11/20/2015 15:03	WG829835
Chromium	13.4		0.140	1.29	1	11/20/2015 15:03	WG829835
Copper	56.6		0.530	2.59	1	11/20/2015 15:03	WG829835
Lead	36.7		0.190	0.647	1	11/20/2015 15:03	WG829835
Nickel	16.2		0.490	2.59	1	11/20/2015 15:03	WG829835
Selenium	U		0.740	2.59	1	11/20/2015 15:03	WG829835
Silver	U		0.280	1.29	1	11/25/2015 12:20	WG830710
Thallium	U		0.650	2.59	1	11/20/2015 15:03	WG829835
Zinc	86.3		0.590	6.47	1	11/20/2015 15:03	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.4		1	11/16/2015 09:00	WG829020

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.311	5	11/20/2015 08:38	WG830459
Acrylonitrile	U		0.00895	0.0622	5	11/20/2015 08:38	WG830459
Benzene	U		0.00135	0.00622	5	11/20/2015 08:38	WG830459
Bromobenzene	U		0.00142	0.00622	5	11/20/2015 08:38	WG830459
Bromodichloromethane	U		0.00127	0.00622	5	11/20/2015 08:38	WG830459
Bromoform	U		0.00212	0.00622	5	11/20/2015 08:38	WG830459
Bromomethane	U		0.00670	0.0311	5	11/20/2015 08:38	WG830459
n-Butylbenzene	U		0.00129	0.00622	5	11/20/2015 08:38	WG830459
sec-Butylbenzene	U		0.00100	0.00622	5	11/20/2015 08:38	WG830459
tert-Butylbenzene	U		0.00103	0.00622	5	11/20/2015 08:38	WG830459
Carbon tetrachloride	U		0.00164	0.00622	5	11/20/2015 08:38	WG830459
Chlorobenzene	U		0.00106	0.00622	5	11/20/2015 08:38	WG830459
Chlorodibromomethane	U		0.00186	0.00622	5	11/20/2015 08:38	WG830459
Chloroethane	U		0.00473	0.0311	5	11/20/2015 08:38	WG830459
2-Chloroethyl vinyl ether	U	J4	0.0117	0.311	5	11/20/2015 08:38	WG830459
Chloroform	U		0.00114	0.0311	5	11/20/2015 08:38	WG830459
Chloromethane	U		0.00188	0.0155	5	11/20/2015 08:38	WG830459
2-Chlorotoluene	U		0.00150	0.00622	5	11/20/2015 08:38	WG830459
4-Chlorotoluene	U		0.00120	0.00622	5	11/20/2015 08:38	WG830459
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0311	5	11/20/2015 08:38	WG830459
1,2-Dibromoethane	U		0.00172	0.00622	5	11/20/2015 08:38	WG830459
Dibromomethane	U		0.00191	0.00622	5	11/20/2015 08:38	WG830459
1,2-Dichlorobenzene	U		0.00152	0.00622	5	11/20/2015 08:38	WG830459
1,3-Dichlorobenzene	U		0.00120	0.00622	5	11/20/2015 08:38	WG830459
1,4-Dichlorobenzene	U		0.00113	0.00622	5	11/20/2015 08:38	WG830459
Dichlorodifluoromethane	U		0.00356	0.0311	5	11/20/2015 08:38	WG830459
1,1-Dichloroethane	U		0.000995	0.00622	5	11/20/2015 08:38	WG830459
1,2-Dichloroethane	U		0.00132	0.00622	5	11/20/2015 08:38	WG830459
1,1-Dichloroethene	U		0.00152	0.00622	5	11/20/2015 08:38	WG830459
cis-1,2-Dichloroethene	U		0.00118	0.00622	5	11/20/2015 08:38	WG830459
trans-1,2-Dichloroethene	U		0.00132	0.00622	5	11/20/2015 08:38	WG830459
1,2-Dichloropropane	U		0.00179	0.00622	5	11/20/2015 08:38	WG830459
1,1-Dichloropropene	U		0.00158	0.00622	5	11/20/2015 08:38	WG830459
1,3-Dichloropropane	U		0.00104	0.00622	5	11/20/2015 08:38	WG830459
cis-1,3-Dichloropropene	U		0.00131	0.00622	5	11/20/2015 08:38	WG830459
trans-1,3-Dichloropropene	U		0.00134	0.00622	5	11/20/2015 08:38	WG830459
2,2-Dichloropropane	U		0.00140	0.00622	5	11/20/2015 08:38	WG830459
Di-isopropyl ether	U		0.00124	0.00622	5	11/20/2015 08:38	WG830459
Ethylbenzene	U		0.00148	0.00622	5	11/20/2015 08:38	WG830459
Hexachloro-1,3-butadiene	U		0.00171	0.00622	5	11/20/2015 08:38	WG830459
Isopropylbenzene	U		0.00122	0.00622	5	11/20/2015 08:38	WG830459
p-Isopropyltoluene	U		0.00102	0.00622	5	11/20/2015 08:38	WG830459
2-Butanone (MEK)	U		0.0234	0.0622	5	11/20/2015 08:38	WG830459
Methylene Chloride	0.00730	J	0.00500	0.0311	5	11/20/2015 08:38	WG830459
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0622	5	11/20/2015 08:38	WG830459
Methyl tert-butyl ether	U		0.00106	0.00622	5	11/20/2015 08:38	WG830459
Naphthalene	U		0.00500	0.0311	5	11/20/2015 08:38	WG830459
n-Propylbenzene	U		0.00103	0.00622	5	11/20/2015 08:38	WG830459
Styrene	U		0.00117	0.00622	5	11/20/2015 08:38	WG830459
1,1,1,2-Tetrachloroethane	U		0.00132	0.00622	5	11/20/2015 08:38	WG830459

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00622	5	11/20/2015 08:38	WG830459
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00622	5	11/20/2015 08:38	WG830459
Tetrachloroethene	U		0.00138	0.00622	5	11/20/2015 08:38	WG830459
Toluene	U		0.00217	0.0311	5	11/20/2015 08:38	WG830459
1,2,3-Trichlorobenzene	U		0.00153	0.00622	5	11/20/2015 08:38	WG830459
1,2,4-Trichlorobenzene	U		0.00194	0.00622	5	11/20/2015 08:38	WG830459
1,1,1-Trichloroethane	U		0.00143	0.00622	5	11/20/2015 08:38	WG830459
1,1,2-Trichloroethane	U		0.00138	0.00622	5	11/20/2015 08:38	WG830459
Trichloroethene	U		0.00140	0.00622	5	11/20/2015 08:38	WG830459
Trichlorofluoromethane	U		0.00191	0.0311	5	11/20/2015 08:38	WG830459
1,2,3-Trichloropropane	U		0.00370	0.0155	5	11/20/2015 08:38	WG830459
1,2,4-Trimethylbenzene	0.00153	J	0.00106	0.00622	5	11/20/2015 08:38	WG830459
1,2,3-Trimethylbenzene	U		0.00144	0.00622	5	11/20/2015 08:38	WG830459
1,3,5-Trimethylbenzene	U		0.00133	0.00622	5	11/20/2015 08:38	WG830459
Vinyl chloride	U		0.00146	0.00622	5	11/20/2015 08:38	WG830459
Xylenes, Total	U		0.00349	0.0187	5	11/20/2015 08:38	WG830459
(S) Toluene-d8	*103*			*88.7-115*		*11/20/2015 08:38*	WG830459
(S) Dibromofluoromethane	*102*			*76.3-123*		*11/20/2015 08:38*	WG830459
(S) 4-Bromofluorobenzene	*98.5*			*69.7-129*		*11/20/2015 08:38*	WG830459

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	0.000200	J	0.000150	0.000500	1	11/18/2015 13:34	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:25	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:00	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:00	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:00	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:00	WG829919
Nickel,Dissolved	0.00702	J	0.00490	0.0100	1	11/18/2015 22:00	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:00	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:00	WG829919
Zinc,Dissolved	0.0168	J	0.00590	0.0500	1	11/18/2015 22:00	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.00483		0.000210	0.00200	1	11/20/2015 00:35	WG829833
Arsenic,Dissolved	0.00526		0.000250	0.00200	1	11/20/2015 00:35	WG829833
Lead,Dissolved	0.000313	J	0.000240	0.00200	1	11/20/2015 00:35	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 00:35	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 07:11	WG829042
Acrolein	U	J5	0.00887	0.0500	1	11/15/2015 07:11	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 07:11	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 07:11	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 07:11	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 07:11	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 07:11	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 07:11	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 07:11	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 07:11	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 07:11	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 07:11	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 07:11	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 07:11	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 07:11	WG829042
2-Chloroethyl vinyl ether	U	J3 J6	0.00301	0.0500	1	11/15/2015 07:11	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 07:11	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 07:11	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 07:11	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 07:11	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 07:11	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 07:11	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 07:11	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 07:11	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 07:11	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 07:11	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 07:11	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 07:11	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 07:11	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 07:11	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 07:11	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 07:11	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 07:11	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 07:11	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 07:11	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 07:11	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 07:11	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 07:11	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 07:11	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 07:11	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 07:11	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 07:11	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 07:11	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 07:11	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 07:11	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 07:11	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 07:11	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 07:11	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 07:11	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 07:11	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 07:11	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 07:11	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 07:11	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 07:11	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 07:11	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 07:11	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 07:11	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 07:11	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 07:11	WG829042
Trichloroethene	U		0.000398	0.00100	1	11/15/2015 07:11	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 07:11	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 07:11	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 07:11	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 07:11	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 07:11	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 07:11	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 07:11	WG829042
(S) Toluene-d8	*97.2*			*90.0-115*		*11/15/2015 07:11*	WG829042
(S) Dibromofluoromethane	*92.8*			*79.0-121*		*11/15/2015 07:11*	WG829042
(S) 4-Bromofluorobenzene	*95.1*			*80.1-120*		*11/15/2015 07:11*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.9		1	11/16/2015 09:01	WG829020

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	156		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	3.25		0.640	2.50	1	11/17/2015 09:20	WG828921

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.83		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-05 WG828925: 7.83 at 22.6c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.180		0.00280	0.0250	1	11/16/2015 13:03	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.50	1	11/20/2015 15:43	WG829835
Arsenic	8.77		0.650	2.50	1	11/20/2015 15:43	WG829835
Beryllium	0.761		0.0700	0.250	1	11/20/2015 15:43	WG829835
Cadmium	0.736		0.0700	0.626	1	11/20/2015 15:43	WG829835
Chromium	13.0		0.140	1.25	1	11/20/2015 15:43	WG829835
Copper	48.4		0.530	2.50	1	11/20/2015 15:43	WG829835
Lead	127		0.190	0.626	1	11/20/2015 15:43	WG829835
Nickel	14.5		0.490	2.50	1	11/20/2015 15:43	WG829835
Selenium	U		0.740	2.50	1	11/20/2015 15:43	WG829835
Silver	U		0.280	1.25	1	11/25/2015 12:23	WG830710
Thallium	U		0.650	2.50	1	11/20/2015 15:43	WG829835
Zinc	97.6		0.590	6.26	1	11/20/2015 15:43	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	83.8		1	11/16/2015 09:01	WG829020

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.298	5	11/17/2015 01:37	WG829033
Acrylonitrile	U		0.00895	0.0596	5	11/17/2015 01:37	WG829033
Benzene	U		0.00135	0.00596	5	11/17/2015 01:37	WG829033
Bromobenzene	U		0.00142	0.00596	5	11/17/2015 01:37	WG829033
Bromodichloromethane	U		0.00127	0.00596	5	11/17/2015 01:37	WG829033
Bromoform	U		0.00212	0.00596	5	11/17/2015 01:37	WG829033
Bromomethane	U		0.00670	0.0298	5	11/17/2015 01:37	WG829033
n-Butylbenzene	U		0.00129	0.00596	5	11/17/2015 01:37	WG829033
sec-Butylbenzene	U		0.00100	0.00596	5	11/17/2015 01:37	WG829033
tert-Butylbenzene	U		0.00103	0.00596	5	11/17/2015 01:37	WG829033
Carbon tetrachloride	U		0.00164	0.00596	5	11/17/2015 01:37	WG829033
Chlorobenzene	U		0.00106	0.00596	5	11/17/2015 01:37	WG829033
Chlorodibromomethane	U		0.00186	0.00596	5	11/17/2015 01:37	WG829033
Chloroethane	U		0.00473	0.0298	5	11/17/2015 01:37	WG829033
2-Chloroethyl vinyl ether	U		0.0117	0.298	5	11/17/2015 01:37	WG829033
Chloroform	U		0.00114	0.0298	5	11/17/2015 01:37	WG829033
Chloromethane	U		0.00188	0.0149	5	11/17/2015 01:37	WG829033
2-Chlorotoluene	U		0.00150	0.00596	5	11/17/2015 01:37	WG829033
4-Chlorotoluene	U		0.00120	0.00596	5	11/17/2015 01:37	WG829033
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0298	5	11/17/2015 01:37	WG829033
1,2-Dibromoethane	U		0.00172	0.00596	5	11/17/2015 01:37	WG829033
Dibromomethane	U		0.00191	0.00596	5	11/17/2015 01:37	WG829033
1,2-Dichlorobenzene	U		0.00152	0.00596	5	11/17/2015 01:37	WG829033
1,3-Dichlorobenzene	U		0.00120	0.00596	5	11/17/2015 01:37	WG829033
1,4-Dichlorobenzene	U		0.00113	0.00596	5	11/17/2015 01:37	WG829033
Dichlorodifluoromethane	U		0.00356	0.0298	5	11/17/2015 01:37	WG829033
1,1-Dichloroethane	U		0.000995	0.00596	5	11/17/2015 01:37	WG829033
1,2-Dichloroethane	U		0.00132	0.00596	5	11/17/2015 01:37	WG829033
1,1-Dichloroethene	U		0.00152	0.00596	5	11/17/2015 01:37	WG829033
cis-1,2-Dichloroethene	U		0.00118	0.00596	5	11/17/2015 01:37	WG829033
trans-1,2-Dichloroethene	U		0.00132	0.00596	5	11/17/2015 01:37	WG829033
1,2-Dichloropropane	U		0.00179	0.00596	5	11/17/2015 01:37	WG829033
1,1-Dichloropropene	U		0.00158	0.00596	5	11/17/2015 01:37	WG829033
1,3-Dichloropropane	U		0.00104	0.00596	5	11/17/2015 01:37	WG829033
cis-1,3-Dichloropropene	U		0.00131	0.00596	5	11/17/2015 01:37	WG829033
trans-1,3-Dichloropropene	U		0.00134	0.00596	5	11/17/2015 01:37	WG829033
2,2-Dichloropropane	U		0.00140	0.00596	5	11/17/2015 01:37	WG829033
Di-isopropyl ether	U		0.00124	0.00596	5	11/17/2015 01:37	WG829033
Ethylbenzene	U		0.00148	0.00596	5	11/17/2015 01:37	WG829033
Hexachloro-1,3-butadiene	U		0.00171	0.00596	5	11/17/2015 01:37	WG829033
Isopropylbenzene	U		0.00122	0.00596	5	11/17/2015 01:37	WG829033
p-Isopropyltoluene	U		0.00102	0.00596	5	11/17/2015 01:37	WG829033
2-Butanone (MEK)	U		0.0234	0.0596	5	11/17/2015 01:37	WG829033
Methylene Chloride	U		0.00500	0.0298	5	11/17/2015 01:37	WG829033
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0596	5	11/17/2015 01:37	WG829033
Methyl tert-butyl ether	U		0.00106	0.00596	5	11/17/2015 01:37	WG829033
Naphthalene	U		0.00500	0.0298	5	11/17/2015 01:37	WG829033
n-Propylbenzene	U		0.00103	0.00596	5	11/17/2015 01:37	WG829033
Styrene	U		0.00117	0.00596	5	11/17/2015 01:37	WG829033
1,1,1,2-Tetrachloroethane	U		0.00132	0.00596	5	11/17/2015 01:37	WG829033

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00596	5	11/17/2015 01:37	WG829033
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00596	5	11/17/2015 01:37	WG829033
Tetrachloroethene	U		0.00138	0.00596	5	11/17/2015 01:37	WG829033
Toluene	U		0.00217	0.0298	5	11/17/2015 01:37	WG829033
1,2,3-Trichlorobenzene	U		0.00153	0.00596	5	11/17/2015 01:37	WG829033
1,2,4-Trichlorobenzene	U		0.00194	0.00596	5	11/17/2015 01:37	WG829033
1,1,1-Trichloroethane	U		0.00143	0.00596	5	11/17/2015 01:37	WG829033
1,1,2-Trichloroethane	U		0.00138	0.00596	5	11/17/2015 01:37	WG829033
Trichloroethene	U		0.00140	0.00596	5	11/17/2015 01:37	WG829033
Trichlorofluoromethane	U		0.00191	0.0298	5	11/17/2015 01:37	WG829033
1,2,3-Trichloropropane	U		0.00370	0.0149	5	11/17/2015 01:37	WG829033
1,2,4-Trimethylbenzene	U		0.00106	0.00596	5	11/17/2015 01:37	WG829033
1,2,3-Trimethylbenzene	U		0.00144	0.00596	5	11/17/2015 01:37	WG829033
1,3,5-Trimethylbenzene	U		0.00133	0.00596	5	11/17/2015 01:37	WG829033
Vinyl chloride	U		0.00146	0.00596	5	11/17/2015 01:37	WG829033
Xylenes, Total	U		0.00349	0.0179	5	11/17/2015 01:37	WG829033
(S) Toluene-d8	*101*			*88.7-115*		*11/17/2015 01:37*	WG829033
(S) Dibromofluoromethane	*95.2*			*76.3-123*		*11/17/2015 01:37*	WG829033
(S) 4-Bromofluorobenzene	*103*			*69.7-129*		*11/17/2015 01:37*	WG829033

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/18/2015 14:21	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:31	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:15	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:15	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:15	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:15	WG829919
Nickel,Dissolved	0.00556	J	0.00490	0.0100	1	11/18/2015 22:15	WG829919
Selenium,Dissolved	0.0101		0.00740	0.0100	1	11/18/2015 22:15	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:15	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:15	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000940	J	0.000210	0.00200	1	11/20/2015 00:37	WG829833
Arsenic,Dissolved	0.00150	J	0.000250	0.00200	1	11/20/2015 00:37	WG829833
Lead,Dissolved	U		0.000240	0.00200	1	11/20/2015 00:37	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 00:37	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 07:32	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 07:32	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 07:32	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 07:32	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 07:32	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 07:32	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 07:32	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 07:32	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 07:32	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 07:32	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 07:32	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 07:32	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 07:32	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 07:32	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 07:32	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 07:32	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 07:32	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 07:32	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 07:32	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 07:32	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 07:32	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 07:32	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 07:32	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 07:32	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 07:32	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 07:32	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 07:32	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 07:32	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 07:32	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 07:32	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 07:32	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 07:32	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 07:32	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 07:32	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 07:32	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 07:32	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 07:32	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 07:32	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 07:32	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 07:32	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 07:32	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 07:32	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 07:32	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 07:32	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 07:32	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 07:32	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 07:32	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 07:32	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 07:32	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 07:32	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 07:32	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 07:32	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 07:32	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 07:32	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 07:32	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 07:32	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 07:32	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 07:32	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 07:32	WG829042
Trichloroethene	0.00487		0.000398	0.00100	1	11/15/2015 07:32	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 07:32	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 07:32	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 07:32	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 07:32	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 07:32	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 07:32	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 07:32	WG829042
(S) Toluene-d8	*97.2*			*90.0-115*		*11/15/2015 07:32*	WG829042
(S) Dibromofluoromethane	*95.3*			*79.0-121*		*11/15/2015 07:32*	WG829042
(S) 4-Bromofluorobenzene	*97.3*			*80.1-120*		*11/15/2015 07:32*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	81.1		1	11/16/2015 09:01	WG829020

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	147		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	11.3		0.640	2.47	1	11/17/2015 09:22	WG828921

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.52		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-08 WG828925: 7.52 at 22.4c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0250		0.00280	0.0247	1	11/16/2015 13:06	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.47	1	11/20/2015 15:46	WG829835
Arsenic	8.47		0.650	2.47	1	11/20/2015 15:46	WG829835
Beryllium	0.851		0.0700	0.247	1	11/20/2015 15:46	WG829835
Cadmium	0.251	J	0.0700	0.616	1	11/20/2015 15:46	WG829835
Chromium	8.71		0.140	1.23	1	11/20/2015 15:46	WG829835
Copper	39.6		0.530	2.47	1	11/20/2015 15:46	WG829835
Lead	45.2		0.190	0.616	1	11/20/2015 15:46	WG829835
Nickel	14.0		0.490	2.47	1	11/20/2015 15:46	WG829835
Selenium	U		0.740	2.47	1	11/20/2015 15:46	WG829835
Silver	U		0.280	1.23	1	11/25/2015 12:32	WG830710
Thallium	U		0.650	2.47	1	11/20/2015 15:46	WG829835
Zinc	61.6		0.590	6.16	1	11/20/2015 15:46	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.3		1	11/16/2015 09:01	WG829020

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.315	5	11/17/2015 02:01	WG829033
Acrylonitrile	U		0.00895	0.0631	5	11/17/2015 02:01	WG829033
Benzene	U		0.00135	0.00631	5	11/17/2015 02:01	WG829033
Bromobenzene	U		0.00142	0.00631	5	11/17/2015 02:01	WG829033
Bromodichloromethane	U		0.00127	0.00631	5	11/17/2015 02:01	WG829033
Bromoform	U		0.00212	0.00631	5	11/17/2015 02:01	WG829033
Bromomethane	U		0.00670	0.0315	5	11/17/2015 02:01	WG829033
n-Butylbenzene	U		0.00129	0.00631	5	11/17/2015 02:01	WG829033
sec-Butylbenzene	U		0.00100	0.00631	5	11/17/2015 02:01	WG829033
tert-Butylbenzene	U		0.00103	0.00631	5	11/17/2015 02:01	WG829033
Carbon tetrachloride	U		0.00164	0.00631	5	11/17/2015 02:01	WG829033
Chlorobenzene	U		0.00106	0.00631	5	11/17/2015 02:01	WG829033
Chlorodibromomethane	U		0.00186	0.00631	5	11/17/2015 02:01	WG829033
Chloroethane	U		0.00473	0.0315	5	11/17/2015 02:01	WG829033
2-Chloroethyl vinyl ether	U		0.0117	0.315	5	11/17/2015 02:01	WG829033
Chloroform	U		0.00114	0.0315	5	11/17/2015 02:01	WG829033
Chloromethane	U		0.00188	0.0158	5	11/17/2015 02:01	WG829033
2-Chlorotoluene	U		0.00150	0.00631	5	11/17/2015 02:01	WG829033
4-Chlorotoluene	U		0.00120	0.00631	5	11/17/2015 02:01	WG829033
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0315	5	11/17/2015 02:01	WG829033
1,2-Dibromoethane	U		0.00172	0.00631	5	11/17/2015 02:01	WG829033
Dibromomethane	U		0.00191	0.00631	5	11/17/2015 02:01	WG829033
1,2-Dichlorobenzene	U		0.00152	0.00631	5	11/17/2015 02:01	WG829033
1,3-Dichlorobenzene	U		0.00120	0.00631	5	11/17/2015 02:01	WG829033
1,4-Dichlorobenzene	U		0.00113	0.00631	5	11/17/2015 02:01	WG829033
Dichlorodifluoromethane	U		0.00356	0.0315	5	11/17/2015 02:01	WG829033
1,1-Dichloroethane	U		0.000995	0.00631	5	11/17/2015 02:01	WG829033
1,2-Dichloroethane	U		0.00132	0.00631	5	11/17/2015 02:01	WG829033
1,1-Dichloroethene	U		0.00152	0.00631	5	11/17/2015 02:01	WG829033
cis-1,2-Dichloroethene	U		0.00118	0.00631	5	11/17/2015 02:01	WG829033
trans-1,2-Dichloroethene	U		0.00132	0.00631	5	11/17/2015 02:01	WG829033
1,2-Dichloropropane	U		0.00179	0.00631	5	11/17/2015 02:01	WG829033
1,1-Dichloropropene	U		0.00158	0.00631	5	11/17/2015 02:01	WG829033
1,3-Dichloropropane	U		0.00104	0.00631	5	11/17/2015 02:01	WG829033
cis-1,3-Dichloropropene	U		0.00131	0.00631	5	11/17/2015 02:01	WG829033
trans-1,3-Dichloropropene	U		0.00134	0.00631	5	11/17/2015 02:01	WG829033
2,2-Dichloropropane	U		0.00140	0.00631	5	11/17/2015 02:01	WG829033
Di-isopropyl ether	U		0.00124	0.00631	5	11/17/2015 02:01	WG829033
Ethylbenzene	U		0.00148	0.00631	5	11/17/2015 02:01	WG829033
Hexachloro-1,3-butadiene	U		0.00171	0.00631	5	11/17/2015 02:01	WG829033
Isopropylbenzene	U		0.00122	0.00631	5	11/17/2015 02:01	WG829033
p-Isopropyltoluene	U		0.00102	0.00631	5	11/17/2015 02:01	WG829033
2-Butanone (MEK)	U		0.0234	0.0631	5	11/17/2015 02:01	WG829033
Methylene Chloride	U		0.00500	0.0315	5	11/17/2015 02:01	WG829033
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0631	5	11/17/2015 02:01	WG829033
Methyl tert-butyl ether	U		0.00106	0.00631	5	11/17/2015 02:01	WG829033
Naphthalene	U		0.00500	0.0315	5	11/17/2015 02:01	WG829033
n-Propylbenzene	U		0.00103	0.00631	5	11/17/2015 02:01	WG829033
Styrene	U		0.00117	0.00631	5	11/17/2015 02:01	WG829033
1,1,1,2-Tetrachloroethane	U		0.00132	0.00631	5	11/17/2015 02:01	WG829033

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00631	5	11/17/2015 02:01	WG829033
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00631	5	11/17/2015 02:01	WG829033
Tetrachloroethene	U		0.00138	0.00631	5	11/17/2015 02:01	WG829033
Toluene	U		0.00217	0.0315	5	11/17/2015 02:01	WG829033
1,2,3-Trichlorobenzene	U		0.00153	0.00631	5	11/17/2015 02:01	WG829033
1,2,4-Trichlorobenzene	U		0.00194	0.00631	5	11/17/2015 02:01	WG829033
1,1,1-Trichloroethane	U		0.00143	0.00631	5	11/17/2015 02:01	WG829033
1,1,2-Trichloroethane	U		0.00138	0.00631	5	11/17/2015 02:01	WG829033
Trichloroethene	U		0.00140	0.00631	5	11/17/2015 02:01	WG829033
Trichlorofluoromethane	U		0.00191	0.0315	5	11/17/2015 02:01	WG829033
1,2,3-Trichloropropane	U		0.00370	0.0158	5	11/17/2015 02:01	WG829033
1,2,4-Trimethylbenzene	U		0.00106	0.00631	5	11/17/2015 02:01	WG829033
1,2,3-Trimethylbenzene	U		0.00144	0.00631	5	11/17/2015 02:01	WG829033
1,3,5-Trimethylbenzene	U		0.00133	0.00631	5	11/17/2015 02:01	WG829033
Vinyl chloride	U		0.00146	0.00631	5	11/17/2015 02:01	WG829033
Xylenes, Total	U		0.00349	0.0189	5	11/17/2015 02:01	WG829033
(S) Toluene-d8	*105*			*88.7-115*		*11/17/2015 02:01*	WG829033
(S) Dibromofluoromethane	*98.6*			*76.3-123*		*11/17/2015 02:01*	WG829033
(S) 4-Bromofluorobenzene	*103*			*69.7-129*		*11/17/2015 02:01*	WG829033

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	0.000200	J	0.000150	0.000500	1	11/18/2015 14:40	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	0.0000493	J	0.0000490	0.000200	1	11/17/2015 11:34	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:18	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:18	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:18	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:18	WG829919
Nickel,Dissolved	U		0.00490	0.0100	1	11/18/2015 22:18	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:18	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:18	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:18	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	U		0.000210	0.00200	1	11/20/2015 00:40	WG829833
Arsenic,Dissolved	0.00158	J	0.000250	0.00200	1	11/20/2015 00:40	WG829833
Lead,Dissolved	U		0.000240	0.00200	1	11/20/2015 00:40	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 00:40	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 07:52	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 07:52	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 07:52	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 07:52	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 07:52	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 07:52	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 07:52	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 07:52	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 07:52	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 07:52	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 07:52	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 07:52	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 07:52	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 07:52	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 07:52	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 07:52	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 07:52	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 07:52	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 07:52	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 07:52	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 07:52	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 07:52	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 07:52	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 07:52	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 07:52	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 07:52	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 07:52	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 07:52	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 07:52	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 07:52	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 07:52	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 07:52	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 07:52	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 07:52	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 07:52	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 07:52	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 07:52	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 07:52	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 07:52	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 07:52	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 07:52	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 07:52	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 07:52	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 07:52	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 07:52	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 07:52	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 07:52	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 07:52	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 07:52	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 07:52	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 07:52	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 07:52	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 07:52	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 07:52	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 07:52	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 07:52	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 07:52	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 07:52	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 07:52	WG829042
Trichloroethene	0.00727		0.000398	0.00100	1	11/15/2015 07:52	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 07:52	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 07:52	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 07:52	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 07:52	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 07:52	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 07:52	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 07:52	WG829042
(S) Toluene-d8	*97.4*			*90.0-115*		*11/15/2015 07:52*	WG829042
(S) Dibromofluoromethane	*94.4*			*79.0-121*		*11/15/2015 07:52*	WG829042
(S) 4-Bromofluorobenzene	*98.0*			*80.1-120*		*11/15/2015 07:52*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	81.5		1	11/16/2015 09:01	WG829020

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	141		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	18.4	J6	0.640	2.45	1	11/17/2015 09:24	WG828921

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.20		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-11 WG828925: 8.20 at 22.4c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.171		0.00280	0.0245	1	11/16/2015 13:09	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	1.82	J	0.750	2.45	1	11/20/2015 15:49	WG829835
Arsenic	8.33		0.650	2.45	1	11/20/2015 15:49	WG829835
Beryllium	0.641		0.0700	0.245	1	11/20/2015 15:49	WG829835
Cadmium	0.870		0.0700	0.613	1	11/20/2015 15:49	WG829835
Chromium	13.8		0.140	1.23	1	11/20/2015 15:49	WG829835
Copper	44.5		0.530	2.45	1	11/20/2015 15:49	WG829835
Lead	129		0.190	0.613	1	11/20/2015 15:49	WG829835
Nickel	13.2		0.490	2.45	1	11/20/2015 15:49	WG829835
Selenium	U		0.740	2.45	1	11/20/2015 15:49	WG829835
Silver	4.11		0.280	1.23	1	11/25/2015 12:35	WG830710
Thallium	U		0.650	2.45	1	11/20/2015 15:49	WG829835
Zinc	138		0.590	6.13	1	11/20/2015 15:49	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.6		1	11/16/2015 09:02	WG829020

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J3 J5	0.0500	0.314	5	11/17/2015 02:26	WG829033
Acrylonitrile	U	J3	0.00895	0.0628	5	11/17/2015 02:26	WG829033
Benzene	U		0.00135	0.00628	5	11/17/2015 02:26	WG829033
Bromobenzene	U		0.00142	0.00628	5	11/17/2015 02:26	WG829033
Bromodichloromethane	U		0.00127	0.00628	5	11/17/2015 02:26	WG829033
Bromoform	U		0.00212	0.00628	5	11/17/2015 02:26	WG829033
Bromomethane	U		0.00670	0.0314	5	11/17/2015 02:26	WG829033
n-Butylbenzene	U		0.00129	0.00628	5	11/17/2015 02:26	WG829033
sec-Butylbenzene	U		0.00100	0.00628	5	11/17/2015 02:26	WG829033
tert-Butylbenzene	U		0.00103	0.00628	5	11/17/2015 02:26	WG829033
Carbon tetrachloride	U		0.00164	0.00628	5	11/17/2015 02:26	WG829033
Chlorobenzene	U		0.00106	0.00628	5	11/17/2015 02:26	WG829033
Chlorodibromomethane	U		0.00186	0.00628	5	11/17/2015 02:26	WG829033
Chloroethane	U		0.00473	0.0314	5	11/17/2015 02:26	WG829033
2-Chloroethyl vinyl ether	U		0.0117	0.314	5	11/17/2015 02:26	WG829033
Chloroform	U		0.00114	0.0314	5	11/17/2015 02:26	WG829033
Chloromethane	U		0.00188	0.0157	5	11/17/2015 02:26	WG829033
2-Chlorotoluene	U		0.00150	0.00628	5	11/17/2015 02:26	WG829033
4-Chlorotoluene	U		0.00120	0.00628	5	11/17/2015 02:26	WG829033
1,2-Dibromo-3-Chloropropane	U	J3	0.00525	0.0314	5	11/17/2015 02:26	WG829033
1,2-Dibromoethane	U		0.00172	0.00628	5	11/17/2015 02:26	WG829033
Dibromomethane	U		0.00191	0.00628	5	11/17/2015 02:26	WG829033
1,2-Dichlorobenzene	U		0.00152	0.00628	5	11/17/2015 02:26	WG829033
1,3-Dichlorobenzene	U		0.00120	0.00628	5	11/17/2015 02:26	WG829033
1,4-Dichlorobenzene	U		0.00113	0.00628	5	11/17/2015 02:26	WG829033
Dichlorodifluoromethane	U		0.00356	0.0314	5	11/17/2015 02:26	WG829033
1,1-Dichloroethane	U		0.000995	0.00628	5	11/17/2015 02:26	WG829033
1,2-Dichloroethane	U		0.00132	0.00628	5	11/17/2015 02:26	WG829033
1,1-Dichloroethene	U		0.00152	0.00628	5	11/17/2015 02:26	WG829033
cis-1,2-Dichloroethene	U		0.00118	0.00628	5	11/17/2015 02:26	WG829033
trans-1,2-Dichloroethene	U		0.00132	0.00628	5	11/17/2015 02:26	WG829033
1,2-Dichloropropane	U		0.00179	0.00628	5	11/17/2015 02:26	WG829033
1,1-Dichloropropene	U		0.00158	0.00628	5	11/17/2015 02:26	WG829033
1,3-Dichloropropane	U		0.00104	0.00628	5	11/17/2015 02:26	WG829033
cis-1,3-Dichloropropene	U		0.00131	0.00628	5	11/17/2015 02:26	WG829033
trans-1,3-Dichloropropene	U		0.00134	0.00628	5	11/17/2015 02:26	WG829033
2,2-Dichloropropane	U		0.00140	0.00628	5	11/17/2015 02:26	WG829033
Di-isopropyl ether	U		0.00124	0.00628	5	11/17/2015 02:26	WG829033
Ethylbenzene	U		0.00148	0.00628	5	11/17/2015 02:26	WG829033
Hexachloro-1,3-butadiene	U		0.00171	0.00628	5	11/17/2015 02:26	WG829033
Isopropylbenzene	U		0.00122	0.00628	5	11/17/2015 02:26	WG829033
p-Isopropyltoluene	U		0.00102	0.00628	5	11/17/2015 02:26	WG829033
2-Butanone (MEK)	U	J3	0.0234	0.0628	5	11/17/2015 02:26	WG829033
Methylene Chloride	U		0.00500	0.0314	5	11/17/2015 02:26	WG829033
4-Methyl-2-pentanone (MIBK)	U	J3	0.00940	0.0628	5	11/17/2015 02:26	WG829033
Methyl tert-butyl ether	U		0.00106	0.00628	5	11/17/2015 02:26	WG829033
Naphthalene	U		0.00500	0.0314	5	11/17/2015 02:26	WG829033
n-Propylbenzene	U		0.00103	0.00628	5	11/17/2015 02:26	WG829033
Styrene	U		0.00117	0.00628	5	11/17/2015 02:26	WG829033
1,1,1,2-Tetrachloroethane	U		0.00132	0.00628	5	11/17/2015 02:26	WG829033

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00628	5	11/17/2015 02:26	WG829033
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00628	5	11/17/2015 02:26	WG829033
Tetrachloroethene	U		0.00138	0.00628	5	11/17/2015 02:26	WG829033
Toluene	U		0.00217	0.0314	5	11/17/2015 02:26	WG829033
1,2,3-Trichlorobenzene	U		0.00153	0.00628	5	11/17/2015 02:26	WG829033
1,2,4-Trichlorobenzene	U		0.00194	0.00628	5	11/17/2015 02:26	WG829033
1,1,1-Trichloroethane	U		0.00143	0.00628	5	11/17/2015 02:26	WG829033
1,1,2-Trichloroethane	U		0.00138	0.00628	5	11/17/2015 02:26	WG829033
Trichloroethene	U		0.00140	0.00628	5	11/17/2015 02:26	WG829033
Trichlorofluoromethane	U		0.00191	0.0314	5	11/17/2015 02:26	WG829033
1,2,3-Trichloropropane	U	J3	0.00370	0.0157	5	11/17/2015 02:26	WG829033
1,2,4-Trimethylbenzene	U		0.00106	0.00628	5	11/17/2015 02:26	WG829033
1,2,3-Trimethylbenzene	U		0.00144	0.00628	5	11/17/2015 02:26	WG829033
1,3,5-Trimethylbenzene	U		0.00133	0.00628	5	11/17/2015 02:26	WG829033
Vinyl chloride	U		0.00146	0.00628	5	11/17/2015 02:26	WG829033
Xylenes, Total	U		0.00349	0.0188	5	11/17/2015 02:26	WG829033
(S) Toluene-d8	*107*			*88.7-115*		*11/17/2015 02:26*	WG829033
(S) Dibromofluoromethane	*99.1*			*76.3-123*		*11/17/2015 02:26*	WG829033
(S) 4-Bromofluorobenzene	*104*			*69.7-129*		*11/17/2015 02:26*	WG829033

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	0.000400	J	0.000150	0.000500	1	11/18/2015 14:49	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:36	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:27	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:27	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:27	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:27	WG829919
Nickel,Dissolved	0.00539	J	0.00490	0.0100	1	11/18/2015 22:27	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:27	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:27	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:27	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000916	J	0.000210	0.00200	1	11/20/2015 00:42	WG829833
Arsenic,Dissolved	0.00182	J	0.000250	0.00200	1	11/20/2015 00:42	WG829833
Lead,Dissolved	U		0.000240	0.00200	1	11/20/2015 00:42	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 00:42	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 08:13	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 08:13	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 08:13	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 08:13	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 08:13	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 08:13	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 08:13	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 08:13	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 08:13	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 08:13	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 08:13	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 08:13	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 08:13	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 08:13	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 08:13	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 08:13	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 08:13	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 08:13	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 08:13	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 08:13	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 08:13	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 08:13	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 08:13	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 08:13	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 08:13	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 08:13	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 08:13	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 08:13	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 08:13	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 08:13	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 08:13	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 08:13	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 08:13	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 08:13	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 08:13	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 08:13	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 08:13	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 08:13	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 08:13	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 08:13	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 08:13	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 08:13	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 08:13	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 08:13	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 08:13	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 08:13	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 08:13	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 08:13	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 08:13	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 08:13	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 08:13	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 08:13	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 08:13	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 08:13	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 08:13	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 08:13	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 08:13	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 08:13	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 08:13	WG829042
Trichloroethene	0.00739		0.000398	0.00100	1	11/15/2015 08:13	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 08:13	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 08:13	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 08:13	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 08:13	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 08:13	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 08:13	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 08:13	WG829042
(S) Toluene-d8	*98.0*			*90.0-115*		*11/15/2015 08:13*	WG829042
(S) Dibromofluoromethane	*95.0*			*79.0-121*		*11/15/2015 08:13*	WG829042
(S) 4-Bromofluorobenzene	*96.8*			*80.1-120*		*11/15/2015 08:13*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.1		1	11/16/2015 09:02	WG829020

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	141		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	1.13	J	0.640	2.35	1	11/17/2015 09:30	WG828921

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.06		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-14 WG828925: 8.06 at 22.5c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0186	J	0.00280	0.0235	1	11/16/2015 13:11	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.35	1	11/20/2015 15:52	WG829835
Arsenic	17.5		0.650	2.35	1	11/20/2015 15:52	WG829835
Beryllium	0.742		0.0700	0.235	1	11/20/2015 15:52	WG829835
Cadmium	0.181	J	0.0700	0.588	1	11/20/2015 15:52	WG829835
Chromium	13.7		0.140	1.18	1	11/20/2015 15:52	WG829835
Copper	37.3		0.530	2.35	1	11/20/2015 15:52	WG829835
Lead	41.7		0.190	0.588	1	11/20/2015 15:52	WG829835
Nickel	16.1		0.490	2.35	1	11/20/2015 15:52	WG829835
Selenium	1.27	J	0.740	2.35	1	11/20/2015 15:52	WG829835
Silver	U		0.280	1.18	1	11/25/2015 12:38	WG830710
Thallium	U		0.650	2.35	1	11/20/2015 15:52	WG829835
Zinc	80.4		0.590	5.88	1	11/20/2015 15:52	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	81.9		1	11/16/2015 09:02	WG829020

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.305	5	11/17/2015 02:50	WG829033
Acrylonitrile	U		0.00895	0.0610	5	11/17/2015 02:50	WG829033
Benzene	U		0.00135	0.00610	5	11/17/2015 02:50	WG829033
Bromobenzene	U		0.00142	0.00610	5	11/17/2015 02:50	WG829033
Bromodichloromethane	U		0.00127	0.00610	5	11/17/2015 02:50	WG829033
Bromoform	U		0.00212	0.00610	5	11/17/2015 02:50	WG829033
Bromomethane	U		0.00670	0.0305	5	11/17/2015 02:50	WG829033
n-Butylbenzene	U		0.00129	0.00610	5	11/17/2015 02:50	WG829033
sec-Butylbenzene	U		0.00100	0.00610	5	11/17/2015 02:50	WG829033
tert-Butylbenzene	U		0.00103	0.00610	5	11/17/2015 02:50	WG829033
Carbon tetrachloride	U		0.00164	0.00610	5	11/17/2015 02:50	WG829033
Chlorobenzene	U		0.00106	0.00610	5	11/17/2015 02:50	WG829033
Chlorodibromomethane	U		0.00186	0.00610	5	11/17/2015 02:50	WG829033
Chloroethane	U		0.00473	0.0305	5	11/17/2015 02:50	WG829033
2-Chloroethyl vinyl ether	U		0.0117	0.305	5	11/17/2015 02:50	WG829033
Chloroform	U		0.00114	0.0305	5	11/17/2015 02:50	WG829033
Chloromethane	U		0.00188	0.0153	5	11/17/2015 02:50	WG829033
2-Chlorotoluene	U		0.00150	0.00610	5	11/17/2015 02:50	WG829033
4-Chlorotoluene	U		0.00120	0.00610	5	11/17/2015 02:50	WG829033
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0305	5	11/17/2015 02:50	WG829033
1,2-Dibromoethane	U		0.00172	0.00610	5	11/17/2015 02:50	WG829033
Dibromomethane	U		0.00191	0.00610	5	11/17/2015 02:50	WG829033
1,2-Dichlorobenzene	U		0.00152	0.00610	5	11/17/2015 02:50	WG829033
1,3-Dichlorobenzene	U		0.00120	0.00610	5	11/17/2015 02:50	WG829033
1,4-Dichlorobenzene	U		0.00113	0.00610	5	11/17/2015 02:50	WG829033
Dichlorodifluoromethane	U		0.00356	0.0305	5	11/17/2015 02:50	WG829033
1,1-Dichloroethane	U		0.000995	0.00610	5	11/17/2015 02:50	WG829033
1,2-Dichloroethane	U		0.00132	0.00610	5	11/17/2015 02:50	WG829033
1,1-Dichloroethene	U		0.00152	0.00610	5	11/17/2015 02:50	WG829033
cis-1,2-Dichloroethene	U		0.00118	0.00610	5	11/17/2015 02:50	WG829033
trans-1,2-Dichloroethene	U		0.00132	0.00610	5	11/17/2015 02:50	WG829033
1,2-Dichloropropane	U		0.00179	0.00610	5	11/17/2015 02:50	WG829033
1,1-Dichloropropene	U		0.00158	0.00610	5	11/17/2015 02:50	WG829033
1,3-Dichloropropane	U		0.00104	0.00610	5	11/17/2015 02:50	WG829033
cis-1,3-Dichloropropene	U		0.00131	0.00610	5	11/17/2015 02:50	WG829033
trans-1,3-Dichloropropene	U		0.00134	0.00610	5	11/17/2015 02:50	WG829033
2,2-Dichloropropane	U		0.00140	0.00610	5	11/17/2015 02:50	WG829033
Di-isopropyl ether	U		0.00124	0.00610	5	11/17/2015 02:50	WG829033
Ethylbenzene	U		0.00148	0.00610	5	11/17/2015 02:50	WG829033
Hexachloro-1,3-butadiene	U		0.00171	0.00610	5	11/17/2015 02:50	WG829033
Isopropylbenzene	U		0.00122	0.00610	5	11/17/2015 02:50	WG829033
p-Isopropyltoluene	U		0.00102	0.00610	5	11/17/2015 02:50	WG829033
2-Butanone (MEK)	U		0.0234	0.0610	5	11/17/2015 02:50	WG829033
Methylene Chloride	U		0.00500	0.0305	5	11/17/2015 02:50	WG829033
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0610	5	11/17/2015 02:50	WG829033
Methyl tert-butyl ether	U		0.00106	0.00610	5	11/17/2015 02:50	WG829033
Naphthalene	U		0.00500	0.0305	5	11/17/2015 02:50	WG829033
n-Propylbenzene	U		0.00103	0.00610	5	11/17/2015 02:50	WG829033
Styrene	U		0.00117	0.00610	5	11/17/2015 02:50	WG829033
1,1,1,2-Tetrachloroethane	U		0.00132	0.00610	5	11/17/2015 02:50	WG829033

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00610	5	11/17/2015 02:50	WG829033
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00610	5	11/17/2015 02:50	WG829033
Tetrachloroethene	U		0.00138	0.00610	5	11/17/2015 02:50	WG829033
Toluene	U		0.00217	0.0305	5	11/17/2015 02:50	WG829033
1,2,3-Trichlorobenzene	U		0.00153	0.00610	5	11/17/2015 02:50	WG829033
1,2,4-Trichlorobenzene	U		0.00194	0.00610	5	11/17/2015 02:50	WG829033
1,1,1-Trichloroethane	U		0.00143	0.00610	5	11/17/2015 02:50	WG829033
1,1,2-Trichloroethane	U		0.00138	0.00610	5	11/17/2015 02:50	WG829033
Trichloroethene	U		0.00140	0.00610	5	11/17/2015 02:50	WG829033
Trichlorofluoromethane	U		0.00191	0.0305	5	11/17/2015 02:50	WG829033
1,2,3-Trichloropropane	U		0.00370	0.0153	5	11/17/2015 02:50	WG829033
1,2,4-Trimethylbenzene	U		0.00106	0.00610	5	11/17/2015 02:50	WG829033
1,2,3-Trimethylbenzene	U		0.00144	0.00610	5	11/17/2015 02:50	WG829033
1,3,5-Trimethylbenzene	U		0.00133	0.00610	5	11/17/2015 02:50	WG829033
Vinyl chloride	U		0.00146	0.00610	5	11/17/2015 02:50	WG829033
Xylenes, Total	U		0.00349	0.0183	5	11/17/2015 02:50	WG829033
(S) Toluene-d8	*103*			*88.7-115*		*11/17/2015 02:50*	WG829033
(S) Dibromofluoromethane	*101*			*76.3-123*		*11/17/2015 02:50*	WG829033
(S) 4-Bromofluorobenzene	*105*			*69.7-129*		*11/17/2015 02:50*	WG829033

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	0.000200	J	0.000150	0.000500	1	11/18/2015 14:57	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:38	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:30	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:30	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:30	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:30	WG829919
Nickel,Dissolved	0.00819	J	0.00490	0.0100	1	11/18/2015 22:30	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:30	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:30	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:30	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.00124	J	0.000210	0.00200	1	11/20/2015 00:44	WG829833
Arsenic,Dissolved	0.00203		0.000250	0.00200	1	11/20/2015 00:44	WG829833
Lead,Dissolved	U		0.000240	0.00200	1	11/20/2015 00:44	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 00:44	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 08:34	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 08:34	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 08:34	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 08:34	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 08:34	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 08:34	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 08:34	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 08:34	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 08:34	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 08:34	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 08:34	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 08:34	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 08:34	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 08:34	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 08:34	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 08:34	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 08:34	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 08:34	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 08:34	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 08:34	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 08:34	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 08:34	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 08:34	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 08:34	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 08:34	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 08:34	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 08:34	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 08:34	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 08:34	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 08:34	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 08:34	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 08:34	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 08:34	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 08:34	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 08:34	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 08:34	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 08:34	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 08:34	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 08:34	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 08:34	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 08:34	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 08:34	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 08:34	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 08:34	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 08:34	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 08:34	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 08:34	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 08:34	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 08:34	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 08:34	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 08:34	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 08:34	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 08:34	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 08:34	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 08:34	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 08:34	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 08:34	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 08:34	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 08:34	WG829042
Trichloroethene	0.0255		0.000398	0.00100	1	11/15/2015 08:34	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 08:34	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 08:34	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 08:34	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 08:34	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 08:34	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 08:34	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 08:34	WG829042
(S) Toluene-d8	*96.9*			*90.0-115*		*11/15/2015 08:34*	WG829042
(S) Dibromofluoromethane	*93.8*			*79.0-121*		*11/15/2015 08:34*	WG829042
(S) 4-Bromofluorobenzene	*95.8*			*80.1-120*		*11/15/2015 08:34*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	83.3		1	11/16/2015 08:55	WG829021

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	140		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.640	2.40	1	11/17/2015 09:30	WG828921

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.28		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-17 WG828925: 8.28 at 22.4c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0213	J	0.00280	0.0240	1	11/16/2015 13:14	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.40	1	11/20/2015 15:56	WG829835
Arsenic	10.0		0.650	2.40	1	11/20/2015 15:56	WG829835
Beryllium	0.228	J	0.0700	0.240	1	11/20/2015 15:56	WG829835
Cadmium	0.403	J	0.0700	0.600	1	11/20/2015 15:56	WG829835
Chromium	5.96		0.140	1.20	1	11/20/2015 15:56	WG829835
Copper	19.6		0.530	2.40	1	11/20/2015 15:56	WG829835
Lead	14.5		0.190	0.600	1	11/20/2015 15:56	WG829835
Nickel	5.45		0.490	2.40	1	11/20/2015 15:56	WG829835
Selenium	U		0.740	2.40	1	11/20/2015 15:56	WG829835
Silver	U		0.280	1.20	1	11/25/2015 12:42	WG830710
Thallium	U		0.650	2.40	1	11/20/2015 15:56	WG829835
Zinc	27.1		0.590	6.00	1	11/20/2015 15:56	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	76.8		1	11/16/2015 08:55	WG829021

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.326	5	11/17/2015 03:14	WG829033
Acrylonitrile	U		0.00895	0.0651	5	11/17/2015 03:14	WG829033
Benzene	U		0.00135	0.00651	5	11/17/2015 03:14	WG829033
Bromobenzene	U		0.00142	0.00651	5	11/17/2015 03:14	WG829033
Bromodichloromethane	U		0.00127	0.00651	5	11/17/2015 03:14	WG829033
Bromoform	U		0.00212	0.00651	5	11/17/2015 03:14	WG829033
Bromomethane	U		0.00670	0.0326	5	11/17/2015 03:14	WG829033
n-Butylbenzene	U		0.00129	0.00651	5	11/17/2015 03:14	WG829033
sec-Butylbenzene	U		0.00100	0.00651	5	11/17/2015 03:14	WG829033
tert-Butylbenzene	U		0.00103	0.00651	5	11/17/2015 03:14	WG829033
Carbon tetrachloride	U		0.00164	0.00651	5	11/17/2015 03:14	WG829033
Chlorobenzene	U		0.00106	0.00651	5	11/17/2015 03:14	WG829033
Chlorodibromomethane	U		0.00186	0.00651	5	11/17/2015 03:14	WG829033
Chloroethane	U		0.00473	0.0326	5	11/17/2015 03:14	WG829033
2-Chloroethyl vinyl ether	U		0.0117	0.326	5	11/17/2015 03:14	WG829033
Chloroform	U		0.00114	0.0326	5	11/17/2015 03:14	WG829033
Chloromethane	U		0.00188	0.0163	5	11/17/2015 03:14	WG829033
2-Chlorotoluene	U		0.00150	0.00651	5	11/17/2015 03:14	WG829033
4-Chlorotoluene	U		0.00120	0.00651	5	11/17/2015 03:14	WG829033
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0326	5	11/17/2015 03:14	WG829033
1,2-Dibromoethane	U		0.00172	0.00651	5	11/17/2015 03:14	WG829033
Dibromomethane	U		0.00191	0.00651	5	11/17/2015 03:14	WG829033
1,2-Dichlorobenzene	U		0.00152	0.00651	5	11/17/2015 03:14	WG829033
1,3-Dichlorobenzene	U		0.00120	0.00651	5	11/17/2015 03:14	WG829033
1,4-Dichlorobenzene	U		0.00113	0.00651	5	11/17/2015 03:14	WG829033
Dichlorodifluoromethane	U		0.00356	0.0326	5	11/17/2015 03:14	WG829033
1,1-Dichloroethane	U		0.000995	0.00651	5	11/17/2015 03:14	WG829033
1,2-Dichloroethane	U		0.00132	0.00651	5	11/17/2015 03:14	WG829033
1,1-Dichloroethene	U		0.00152	0.00651	5	11/17/2015 03:14	WG829033
cis-1,2-Dichloroethene	U		0.00118	0.00651	5	11/17/2015 03:14	WG829033
trans-1,2-Dichloroethene	U		0.00132	0.00651	5	11/17/2015 03:14	WG829033
1,2-Dichloropropane	U		0.00179	0.00651	5	11/17/2015 03:14	WG829033
1,1-Dichloropropene	U		0.00158	0.00651	5	11/17/2015 03:14	WG829033
1,3-Dichloropropane	U		0.00104	0.00651	5	11/17/2015 03:14	WG829033
cis-1,3-Dichloropropene	U		0.00131	0.00651	5	11/17/2015 03:14	WG829033
trans-1,3-Dichloropropene	U		0.00134	0.00651	5	11/17/2015 03:14	WG829033
2,2-Dichloropropane	U		0.00140	0.00651	5	11/17/2015 03:14	WG829033
Di-isopropyl ether	U		0.00124	0.00651	5	11/17/2015 03:14	WG829033
Ethylbenzene	U		0.00148	0.00651	5	11/17/2015 03:14	WG829033
Hexachloro-1,3-butadiene	U		0.00171	0.00651	5	11/17/2015 03:14	WG829033
Isopropylbenzene	U		0.00122	0.00651	5	11/17/2015 03:14	WG829033
p-Isopropyltoluene	U		0.00102	0.00651	5	11/17/2015 03:14	WG829033
2-Butanone (MEK)	U		0.0234	0.0651	5	11/17/2015 03:14	WG829033
Methylene Chloride	U		0.00500	0.0326	5	11/17/2015 03:14	WG829033
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0651	5	11/17/2015 03:14	WG829033
Methyl tert-butyl ether	U		0.00106	0.00651	5	11/17/2015 03:14	WG829033
Naphthalene	U		0.00500	0.0326	5	11/17/2015 03:14	WG829033
n-Propylbenzene	U		0.00103	0.00651	5	11/17/2015 03:14	WG829033
Styrene	U		0.00117	0.00651	5	11/17/2015 03:14	WG829033
1,1,1,2-Tetrachloroethane	U		0.00132	0.00651	5	11/17/2015 03:14	WG829033

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00651	5	11/17/2015 03:14	WG829033
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00651	5	11/17/2015 03:14	WG829033
Tetrachloroethene	U		0.00138	0.00651	5	11/17/2015 03:14	WG829033
Toluene	U		0.00217	0.0326	5	11/17/2015 03:14	WG829033
1,2,3-Trichlorobenzene	U		0.00153	0.00651	5	11/17/2015 03:14	WG829033
1,2,4-Trichlorobenzene	U		0.00194	0.00651	5	11/17/2015 03:14	WG829033
1,1,1-Trichloroethane	U		0.00143	0.00651	5	11/17/2015 03:14	WG829033
1,1,2-Trichloroethane	U		0.00138	0.00651	5	11/17/2015 03:14	WG829033
Trichloroethene	0.00545	J	0.00140	0.00651	5	11/17/2015 03:14	WG829033
Trichlorofluoromethane	U		0.00191	0.0326	5	11/17/2015 03:14	WG829033
1,2,3-Trichloropropane	U		0.00370	0.0163	5	11/17/2015 03:14	WG829033
1,2,4-Trimethylbenzene	U		0.00106	0.00651	5	11/17/2015 03:14	WG829033
1,2,3-Trimethylbenzene	U		0.00144	0.00651	5	11/17/2015 03:14	WG829033
1,3,5-Trimethylbenzene	U		0.00133	0.00651	5	11/17/2015 03:14	WG829033
Vinyl chloride	U		0.00146	0.00651	5	11/17/2015 03:14	WG829033
Xylenes, Total	U		0.00349	0.0195	5	11/17/2015 03:14	WG829033
(S) Toluene-d8	*102*			*88.7-115*		*11/17/2015 03:14*	WG829033
(S) Dibromofluoromethane	*94.5*			*76.3-123*		*11/17/2015 03:14*	WG829033
(S) 4-Bromofluorobenzene	*102*			*69.7-129*		*11/17/2015 03:14*	WG829033

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	0.000300	J	0.000150	0.000500	1	11/18/2015 15:05	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:40	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:33	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:33	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:33	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:33	WG829919
Nickel,Dissolved	0.00718	J	0.00490	0.0100	1	11/18/2015 22:33	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:33	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:33	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:33	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000543	J	0.000210	0.00200	1	11/20/2015 00:47	WG829833
Arsenic,Dissolved	0.00147	J	0.000250	0.00200	1	11/20/2015 00:47	WG829833
Lead,Dissolved	U		0.000240	0.00200	1	11/20/2015 00:47	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 00:47	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 08:54	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 08:54	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 08:54	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 08:54	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 08:54	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 08:54	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 08:54	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 08:54	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 08:54	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 08:54	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 08:54	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 08:54	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 08:54	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 08:54	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 08:54	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 08:54	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 08:54	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 08:54	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 08:54	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 08:54	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 08:54	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 08:54	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 08:54	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 08:54	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 08:54	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 08:54	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 08:54	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 08:54	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 08:54	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 08:54	WG829042
cis-1,2-Dichloroethene	0.0192		0.000260	0.00100	1	11/15/2015 08:54	WG829042
trans-1,2-Dichloroethene	0.000412	J	0.000396	0.00100	1	11/15/2015 08:54	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 08:54	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 08:54	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 08:54	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 08:54	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 08:54	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 08:54	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 08:54	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 08:54	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 08:54	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 08:54	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 08:54	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 08:54	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 08:54	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 08:54	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 08:54	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 08:54	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 08:54	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 08:54	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 08:54	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 08:54	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 08:54	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 08:54	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 08:54	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 08:54	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 08:54	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 08:54	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 08:54	WG829042
Trichloroethene	0.0109		0.000398	0.00100	1	11/15/2015 08:54	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 08:54	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 08:54	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 08:54	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 08:54	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 08:54	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 08:54	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 08:54	WG829042
(S) Toluene-d8	*97.6*			*90.0-115*		*11/15/2015 08:54*	WG829042
(S) Dibromofluoromethane	*93.1*			*79.0-121*		*11/15/2015 08:54*	WG829042
(S) 4-Bromofluorobenzene	*96.6*			*80.1-120*		*11/15/2015 08:54*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	82.2		1	11/16/2015 08:56	WG829021

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	136		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	4.14		0.640	2.43	1	11/17/2015 09:31	WG828921

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.17		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-20 WG828925: 8.17 at 22.4c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.116		0.00280	0.0243	1	11/16/2015 13:16	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.43	1	11/20/2015 15:59	WG829835
Arsenic	16.5		0.650	2.43	1	11/20/2015 15:59	WG829835
Beryllium	0.887		0.0700	0.243	1	11/20/2015 15:59	WG829835
Cadmium	0.0943	J	0.0700	0.608	1	11/20/2015 15:59	WG829835
Chromium	14.8		0.140	1.22	1	11/20/2015 15:59	WG829835
Copper	58.6		0.530	2.43	1	11/20/2015 15:59	WG829835
Lead	31.7		0.190	0.608	1	11/20/2015 15:59	WG829835
Nickel	23.5		0.490	2.43	1	11/20/2015 15:59	WG829835
Selenium	1.40	J	0.740	2.43	1	11/20/2015 15:59	WG829835
Silver	U		0.280	1.22	1	11/25/2015 12:45	WG830710
Thallium	U		0.650	2.43	1	11/20/2015 15:59	WG829835
Zinc	91.6		0.590	6.08	1	11/20/2015 15:59	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	81.5		1	11/16/2015 08:56	WG829021

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.307	5	11/17/2015 03:38	WG829033
Acrylonitrile	U		0.00895	0.0613	5	11/17/2015 03:38	WG829033
Benzene	U		0.00135	0.00613	5	11/17/2015 03:38	WG829033
Bromobenzene	U		0.00142	0.00613	5	11/17/2015 03:38	WG829033
Bromodichloromethane	U		0.00127	0.00613	5	11/17/2015 03:38	WG829033
Bromoform	U		0.00212	0.00613	5	11/17/2015 03:38	WG829033
Bromomethane	U		0.00670	0.0307	5	11/17/2015 03:38	WG829033
n-Butylbenzene	U		0.00129	0.00613	5	11/17/2015 03:38	WG829033
sec-Butylbenzene	U		0.00100	0.00613	5	11/17/2015 03:38	WG829033
tert-Butylbenzene	U		0.00103	0.00613	5	11/17/2015 03:38	WG829033
Carbon tetrachloride	U		0.00164	0.00613	5	11/17/2015 03:38	WG829033
Chlorobenzene	U		0.00106	0.00613	5	11/17/2015 03:38	WG829033
Chlorodibromomethane	U		0.00186	0.00613	5	11/17/2015 03:38	WG829033
Chloroethane	U		0.00473	0.0307	5	11/17/2015 03:38	WG829033
2-Chloroethyl vinyl ether	U		0.0117	0.307	5	11/17/2015 03:38	WG829033
Chloroform	U		0.00114	0.0307	5	11/17/2015 03:38	WG829033
Chloromethane	U		0.00188	0.0153	5	11/17/2015 03:38	WG829033
2-Chlorotoluene	U		0.00150	0.00613	5	11/17/2015 03:38	WG829033
4-Chlorotoluene	U		0.00120	0.00613	5	11/17/2015 03:38	WG829033
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0307	5	11/17/2015 03:38	WG829033
1,2-Dibromoethane	U		0.00172	0.00613	5	11/17/2015 03:38	WG829033
Dibromomethane	U		0.00191	0.00613	5	11/17/2015 03:38	WG829033
1,2-Dichlorobenzene	U		0.00152	0.00613	5	11/17/2015 03:38	WG829033
1,3-Dichlorobenzene	U		0.00120	0.00613	5	11/17/2015 03:38	WG829033
1,4-Dichlorobenzene	U		0.00113	0.00613	5	11/17/2015 03:38	WG829033
Dichlorodifluoromethane	U		0.00356	0.0307	5	11/17/2015 03:38	WG829033
1,1-Dichloroethane	U		0.000995	0.00613	5	11/17/2015 03:38	WG829033
1,2-Dichloroethane	U		0.00132	0.00613	5	11/17/2015 03:38	WG829033
1,1-Dichloroethene	U		0.00152	0.00613	5	11/17/2015 03:38	WG829033
cis-1,2-Dichloroethene	U		0.00118	0.00613	5	11/17/2015 03:38	WG829033
trans-1,2-Dichloroethene	U		0.00132	0.00613	5	11/17/2015 03:38	WG829033
1,2-Dichloropropane	U		0.00179	0.00613	5	11/17/2015 03:38	WG829033
1,1-Dichloropropene	U		0.00158	0.00613	5	11/17/2015 03:38	WG829033
1,3-Dichloropropane	U		0.00104	0.00613	5	11/17/2015 03:38	WG829033
cis-1,3-Dichloropropene	U		0.00131	0.00613	5	11/17/2015 03:38	WG829033
trans-1,3-Dichloropropene	U		0.00134	0.00613	5	11/17/2015 03:38	WG829033
2,2-Dichloropropane	U		0.00140	0.00613	5	11/17/2015 03:38	WG829033
Di-isopropyl ether	U		0.00124	0.00613	5	11/17/2015 03:38	WG829033
Ethylbenzene	U		0.00148	0.00613	5	11/17/2015 03:38	WG829033
Hexachloro-1,3-butadiene	U		0.00171	0.00613	5	11/17/2015 03:38	WG829033
Isopropylbenzene	U		0.00122	0.00613	5	11/17/2015 03:38	WG829033
p-Isopropyltoluene	U		0.00102	0.00613	5	11/17/2015 03:38	WG829033
2-Butanone (MEK)	U		0.0234	0.0613	5	11/17/2015 03:38	WG829033
Methylene Chloride	U		0.00500	0.0307	5	11/17/2015 03:38	WG829033
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0613	5	11/17/2015 03:38	WG829033
Methyl tert-butyl ether	U		0.00106	0.00613	5	11/17/2015 03:38	WG829033
Naphthalene	U		0.00500	0.0307	5	11/17/2015 03:38	WG829033
n-Propylbenzene	U		0.00103	0.00613	5	11/17/2015 03:38	WG829033
Styrene	U		0.00117	0.00613	5	11/17/2015 03:38	WG829033
1,1,1,2-Tetrachloroethane	U		0.00132	0.00613	5	11/17/2015 03:38	WG829033

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00613	5	11/17/2015 03:38	WG829033
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00613	5	11/17/2015 03:38	WG829033
Tetrachloroethene	U		0.00138	0.00613	5	11/17/2015 03:38	WG829033
Toluene	U		0.00217	0.0307	5	11/17/2015 03:38	WG829033
1,2,3-Trichlorobenzene	U		0.00153	0.00613	5	11/17/2015 03:38	WG829033
1,2,4-Trichlorobenzene	U		0.00194	0.00613	5	11/17/2015 03:38	WG829033
1,1,1-Trichloroethane	U		0.00143	0.00613	5	11/17/2015 03:38	WG829033
1,1,2-Trichloroethane	U		0.00138	0.00613	5	11/17/2015 03:38	WG829033
Trichloroethene	U		0.00140	0.00613	5	11/17/2015 03:38	WG829033
Trichlorofluoromethane	U		0.00191	0.0307	5	11/17/2015 03:38	WG829033
1,2,3-Trichloropropane	U		0.00370	0.0153	5	11/17/2015 03:38	WG829033
1,2,4-Trimethylbenzene	U		0.00106	0.00613	5	11/17/2015 03:38	WG829033
1,2,3-Trimethylbenzene	U		0.00144	0.00613	5	11/17/2015 03:38	WG829033
1,3,5-Trimethylbenzene	U		0.00133	0.00613	5	11/17/2015 03:38	WG829033
Vinyl chloride	U		0.00146	0.00613	5	11/17/2015 03:38	WG829033
Xylenes, Total	U		0.00349	0.0184	5	11/17/2015 03:38	WG829033
(S) Toluene-d8	*100*			*88.7-115*		*11/17/2015 03:38*	WG829033
(S) Dibromofluoromethane	*93.9*			*76.3-123*		*11/17/2015 03:38*	WG829033
(S) 4-Bromofluorobenzene	*104*			*69.7-129*		*11/17/2015 03:38*	WG829033

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/18/2015 15:13	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:42	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:36	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:36	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:36	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:36	WG829919
Nickel,Dissolved	U		0.00490	0.0100	1	11/18/2015 22:36	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:36	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:36	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:36	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	U		0.000210	0.00200	1	11/20/2015 00:49	WG829833
Arsenic,Dissolved	0.000981	J	0.000250	0.00200	1	11/20/2015 00:49	WG829833
Lead,Dissolved	U		0.000240	0.00200	1	11/20/2015 00:49	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 00:49	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 09:15	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 09:15	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 09:15	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 09:15	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 09:15	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 09:15	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 09:15	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 09:15	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 09:15	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 09:15	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 09:15	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 09:15	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 09:15	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 09:15	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 09:15	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 09:15	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 09:15	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 09:15	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 09:15	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 09:15	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 09:15	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 09:15	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 09:15	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 09:15	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 09:15	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 09:15	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 09:15	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 09:15	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 09:15	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 09:15	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 09:15	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 09:15	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 09:15	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 09:15	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 09:15	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 09:15	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 09:15	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 09:15	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 09:15	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 09:15	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 09:15	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 09:15	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 09:15	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 09:15	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 09:15	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 09:15	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 09:15	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 09:15	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 09:15	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 09:15	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 09:15	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 09:15	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 09:15	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 09:15	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 09:15	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 09:15	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 09:15	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 09:15	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 09:15	WG829042
Trichloroethene	U		0.000398	0.00100	1	11/15/2015 09:15	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 09:15	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 09:15	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 09:15	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 09:15	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 09:15	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 09:15	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 09:15	WG829042
(S) Toluene-d8	*97.0*			*90.0-115*		*11/15/2015 09:15*	WG829042
(S) Dibromofluoromethane	*95.7*			*79.0-121*		*11/15/2015 09:15*	WG829042
(S) 4-Bromofluorobenzene	*97.2*			*80.1-120*		*11/15/2015 09:15*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	90.5		1	11/16/2015 08:56	WG829021

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	121		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.640	2.21	1	11/17/2015 09:32	WG828921

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.60		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-23 WG828925: 8.60 at 22.6c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.414		0.00280	0.0221	1	11/16/2015 13:19	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	1.93	J	0.750	2.21	1	11/20/2015 16:02	WG829835
Arsenic	15.2		0.650	2.21	1	11/20/2015 16:02	WG829835
Beryllium	1.46		0.0700	0.221	1	11/20/2015 16:02	WG829835
Cadmium	0.408	J	0.0700	0.553	1	11/20/2015 16:02	WG829835
Chromium	6.66		0.140	1.11	1	11/20/2015 16:02	WG829835
Copper	49.8		0.530	2.21	1	11/20/2015 16:02	WG829835
Lead	194		0.190	0.553	1	11/20/2015 16:02	WG829835
Nickel	5.63		0.490	2.21	1	11/20/2015 16:02	WG829835
Selenium	U		0.740	2.21	1	11/20/2015 16:02	WG829835
Silver	U		0.280	1.11	1	11/25/2015 12:48	WG830710
Thallium	U		0.650	2.21	1	11/20/2015 16:02	WG829835
Zinc	92.7		0.590	5.53	1	11/20/2015 16:02	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.9		1	11/16/2015 08:56	WG829021

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.309	5	11/20/2015 08:58	WG830459
Acrylonitrile	U		0.00895	0.0618	5	11/20/2015 08:58	WG830459
Benzene	U		0.00135	0.00618	5	11/20/2015 08:58	WG830459
Bromobenzene	U		0.00142	0.00618	5	11/20/2015 08:58	WG830459
Bromodichloromethane	U		0.00127	0.00618	5	11/20/2015 08:58	WG830459
Bromoform	U		0.00212	0.00618	5	11/20/2015 08:58	WG830459
Bromomethane	U		0.00670	0.0309	5	11/20/2015 08:58	WG830459
n-Butylbenzene	U		0.00129	0.00618	5	11/20/2015 08:58	WG830459
sec-Butylbenzene	U		0.00100	0.00618	5	11/20/2015 08:58	WG830459
tert-Butylbenzene	U		0.00103	0.00618	5	11/20/2015 08:58	WG830459
Carbon tetrachloride	U		0.00164	0.00618	5	11/20/2015 08:58	WG830459
Chlorobenzene	U		0.00106	0.00618	5	11/20/2015 08:58	WG830459
Chlorodibromomethane	U		0.00186	0.00618	5	11/20/2015 08:58	WG830459
Chloroethane	U		0.00473	0.0309	5	11/20/2015 08:58	WG830459
2-Chloroethyl vinyl ether	U	J4	0.0117	0.309	5	11/20/2015 08:58	WG830459
Chloroform	U		0.00114	0.0309	5	11/20/2015 08:58	WG830459
Chloromethane	U		0.00188	0.0155	5	11/20/2015 08:58	WG830459
2-Chlorotoluene	U		0.00150	0.00618	5	11/20/2015 08:58	WG830459
4-Chlorotoluene	U		0.00120	0.00618	5	11/20/2015 08:58	WG830459
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0309	5	11/20/2015 08:58	WG830459
1,2-Dibromoethane	U		0.00172	0.00618	5	11/20/2015 08:58	WG830459
Dibromomethane	U		0.00191	0.00618	5	11/20/2015 08:58	WG830459
1,2-Dichlorobenzene	U		0.00152	0.00618	5	11/20/2015 08:58	WG830459
1,3-Dichlorobenzene	U		0.00120	0.00618	5	11/20/2015 08:58	WG830459
1,4-Dichlorobenzene	U		0.00113	0.00618	5	11/20/2015 08:58	WG830459
Dichlorodifluoromethane	U		0.00356	0.0309	5	11/20/2015 08:58	WG830459
1,1-Dichloroethane	U		0.000995	0.00618	5	11/20/2015 08:58	WG830459
1,2-Dichloroethane	U		0.00132	0.00618	5	11/20/2015 08:58	WG830459
1,1-Dichloroethene	U		0.00152	0.00618	5	11/20/2015 08:58	WG830459
cis-1,2-Dichloroethene	U		0.00118	0.00618	5	11/20/2015 08:58	WG830459
trans-1,2-Dichloroethene	U		0.00132	0.00618	5	11/20/2015 08:58	WG830459
1,2-Dichloropropane	U		0.00179	0.00618	5	11/20/2015 08:58	WG830459
1,1-Dichloropropene	U		0.00158	0.00618	5	11/20/2015 08:58	WG830459
1,3-Dichloropropane	U		0.00104	0.00618	5	11/20/2015 08:58	WG830459
cis-1,3-Dichloropropene	U		0.00131	0.00618	5	11/20/2015 08:58	WG830459
trans-1,3-Dichloropropene	U		0.00134	0.00618	5	11/20/2015 08:58	WG830459
2,2-Dichloropropane	U		0.00140	0.00618	5	11/20/2015 08:58	WG830459
Di-isopropyl ether	U		0.00124	0.00618	5	11/20/2015 08:58	WG830459
Ethylbenzene	U		0.00148	0.00618	5	11/20/2015 08:58	WG830459
Hexachloro-1,3-butadiene	U		0.00171	0.00618	5	11/20/2015 08:58	WG830459
Isopropylbenzene	U		0.00122	0.00618	5	11/20/2015 08:58	WG830459
p-Isopropyltoluene	U		0.00102	0.00618	5	11/20/2015 08:58	WG830459
2-Butanone (MEK)	U		0.0234	0.0618	5	11/20/2015 08:58	WG830459
Methylene Chloride	0.00630	J	0.00500	0.0309	5	11/20/2015 08:58	WG830459
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0618	5	11/20/2015 08:58	WG830459
Methyl tert-butyl ether	U		0.00106	0.00618	5	11/20/2015 08:58	WG830459
Naphthalene	U		0.00500	0.0309	5	11/20/2015 08:58	WG830459
n-Propylbenzene	U		0.00103	0.00618	5	11/20/2015 08:58	WG830459
Styrene	U		0.00117	0.00618	5	11/20/2015 08:58	WG830459
1,1,1,2-Tetrachloroethane	U		0.00132	0.00618	5	11/20/2015 08:58	WG830459

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00618	5	11/20/2015 08:58	WG830459
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00618	5	11/20/2015 08:58	WG830459
Tetrachloroethene	U		0.00138	0.00618	5	11/20/2015 08:58	WG830459
Toluene	U		0.00217	0.0309	5	11/20/2015 08:58	WG830459
1,2,3-Trichlorobenzene	U		0.00153	0.00618	5	11/20/2015 08:58	WG830459
1,2,4-Trichlorobenzene	U		0.00194	0.00618	5	11/20/2015 08:58	WG830459
1,1,1-Trichloroethane	U		0.00143	0.00618	5	11/20/2015 08:58	WG830459
1,1,2-Trichloroethane	U		0.00138	0.00618	5	11/20/2015 08:58	WG830459
Trichloroethene	U		0.00140	0.00618	5	11/20/2015 08:58	WG830459
Trichlorofluoromethane	U		0.00191	0.0309	5	11/20/2015 08:58	WG830459
1,2,3-Trichloropropane	U		0.00370	0.0155	5	11/20/2015 08:58	WG830459
1,2,4-Trimethylbenzene	0.00164	J	0.00106	0.00618	5	11/20/2015 08:58	WG830459
1,2,3-Trimethylbenzene	U		0.00144	0.00618	5	11/20/2015 08:58	WG830459
1,3,5-Trimethylbenzene	U		0.00133	0.00618	5	11/20/2015 08:58	WG830459
Vinyl chloride	U		0.00146	0.00618	5	11/20/2015 08:58	WG830459
Xylenes, Total	0.00615	J	0.00349	0.0186	5	11/20/2015 08:58	WG830459
(S) Toluene-d8	*103*			*88.7-115*		*11/20/2015 08:58*	WG830459
(S) Dibromofluoromethane	*100*			*76.3-123*		*11/20/2015 08:58*	WG830459
(S) 4-Bromofluorobenzene	*99.1*			*69.7-129*		*11/20/2015 08:58*	WG830459

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/18/2015 15:21	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:45	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:39	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:39	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:39	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:39	WG829919
Nickel,Dissolved	U		0.00490	0.0100	1	11/18/2015 22:39	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:39	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:39	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:39	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000371	J	0.000210	0.00200	1	11/20/2015 00:56	WG829833
Arsenic,Dissolved	0.00712		0.000250	0.00200	1	11/20/2015 00:56	WG829833
Lead,Dissolved	0.000402	J	0.000240	0.00200	1	11/20/2015 00:56	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 00:56	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 09:35	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 09:35	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 09:35	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 09:35	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 09:35	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 09:35	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 09:35	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 09:35	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 09:35	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 09:35	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 09:35	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 09:35	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 09:35	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 09:35	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 09:35	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 09:35	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 09:35	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 09:35	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 09:35	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 09:35	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 09:35	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 09:35	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 09:35	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 09:35	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 09:35	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 09:35	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 09:35	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 09:35	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 09:35	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 09:35	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 09:35	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 09:35	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 09:35	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 09:35	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 09:35	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 09:35	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 09:35	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 09:35	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 09:35	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 09:35	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 09:35	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 09:35	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 09:35	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 09:35	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 09:35	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 09:35	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 09:35	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 09:35	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 09:35	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 09:35	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 09:35	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 09:35	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 09:35	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 09:35	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 09:35	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 09:35	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 09:35	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 09:35	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 09:35	WG829042
Trichloroethene	U		0.000398	0.00100	1	11/15/2015 09:35	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 09:35	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 09:35	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 09:35	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 09:35	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 09:35	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 09:35	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 09:35	WG829042
(S) Toluene-d8	*98.5*			*90.0-115*		*11/15/2015 09:35*	WG829042
(S) Dibromofluoromethane	*95.6*			*79.0-121*		*11/15/2015 09:35*	WG829042
(S) 4-Bromofluorobenzene	*98.7*			*80.1-120*		*11/15/2015 09:35*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	84.6		1	11/16/2015 08:56	WG829021

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	123		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	0.993	J	0.640	2.36	1	11/17/2015 09:33	WG828921

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.50		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-26 WG828925: 8.50 at 22.6c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.142		0.00280	0.0236	1	11/16/2015 13:27	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.36	1	11/20/2015 16:05	WG829835
Arsenic	12.4		0.650	2.36	1	11/20/2015 16:05	WG829835
Beryllium	0.525		0.0700	0.236	1	11/20/2015 16:05	WG829835
Cadmium	0.481	J	0.0700	0.591	1	11/20/2015 16:05	WG829835
Chromium	11.6		0.140	1.18	1	11/20/2015 16:05	WG829835
Copper	22.2		0.530	2.36	1	11/20/2015 16:05	WG829835
Lead	56.0		0.190	0.591	1	11/20/2015 16:05	WG829835
Nickel	10.2		0.490	2.36	1	11/20/2015 16:05	WG829835
Selenium	U		0.740	2.36	1	11/20/2015 16:05	WG829835
Silver	U		0.280	1.18	1	11/25/2015 12:51	WG830710
Thallium	U		0.650	2.36	1	11/20/2015 16:05	WG829835
Zinc	71.0		0.590	5.91	1	11/20/2015 16:05	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.0		1	11/16/2015 08:57	WG829021

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.312	5	11/20/2015 11:34	WG830459
Acrylonitrile	U		0.00895	0.0625	5	11/20/2015 11:34	WG830459
Benzene	U		0.00135	0.00625	5	11/20/2015 11:34	WG830459
Bromobenzene	U		0.00142	0.00625	5	11/20/2015 11:34	WG830459
Bromodichloromethane	U		0.00127	0.00625	5	11/20/2015 11:34	WG830459
Bromoform	U		0.00212	0.00625	5	11/20/2015 11:34	WG830459
Bromomethane	U		0.00670	0.0312	5	11/20/2015 11:34	WG830459
n-Butylbenzene	U		0.00129	0.00625	5	11/20/2015 11:34	WG830459
sec-Butylbenzene	U		0.00100	0.00625	5	11/20/2015 11:34	WG830459
tert-Butylbenzene	U		0.00103	0.00625	5	11/20/2015 11:34	WG830459
Carbon tetrachloride	U		0.00164	0.00625	5	11/20/2015 11:34	WG830459
Chlorobenzene	U		0.00106	0.00625	5	11/20/2015 11:34	WG830459
Chlorodibromomethane	U		0.00186	0.00625	5	11/20/2015 11:34	WG830459
Chloroethane	U		0.00473	0.0312	5	11/20/2015 11:34	WG830459
2-Chloroethyl vinyl ether	U	J4	0.0117	0.312	5	11/20/2015 11:34	WG830459
Chloroform	U		0.00114	0.0312	5	11/20/2015 11:34	WG830459
Chloromethane	U		0.00188	0.0156	5	11/20/2015 11:34	WG830459
2-Chlorotoluene	U		0.00150	0.00625	5	11/20/2015 11:34	WG830459
4-Chlorotoluene	U		0.00120	0.00625	5	11/20/2015 11:34	WG830459
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0312	5	11/20/2015 11:34	WG830459
1,2-Dibromoethane	U		0.00172	0.00625	5	11/20/2015 11:34	WG830459
Dibromomethane	U		0.00191	0.00625	5	11/20/2015 11:34	WG830459
1,2-Dichlorobenzene	U		0.00152	0.00625	5	11/20/2015 11:34	WG830459
1,3-Dichlorobenzene	U		0.00120	0.00625	5	11/20/2015 11:34	WG830459
1,4-Dichlorobenzene	U		0.00113	0.00625	5	11/20/2015 11:34	WG830459
Dichlorodifluoromethane	U		0.00356	0.0312	5	11/20/2015 11:34	WG830459
1,1-Dichloroethane	U		0.000995	0.00625	5	11/20/2015 11:34	WG830459
1,2-Dichloroethane	U		0.00132	0.00625	5	11/20/2015 11:34	WG830459
1,1-Dichloroethene	U		0.00152	0.00625	5	11/20/2015 11:34	WG830459
cis-1,2-Dichloroethene	U		0.00118	0.00625	5	11/20/2015 11:34	WG830459
trans-1,2-Dichloroethene	U		0.00132	0.00625	5	11/20/2015 11:34	WG830459
1,2-Dichloropropane	U		0.00179	0.00625	5	11/20/2015 11:34	WG830459
1,1-Dichloropropene	U		0.00158	0.00625	5	11/20/2015 11:34	WG830459
1,3-Dichloropropane	U		0.00104	0.00625	5	11/20/2015 11:34	WG830459
cis-1,3-Dichloropropene	U		0.00131	0.00625	5	11/20/2015 11:34	WG830459
trans-1,3-Dichloropropene	U		0.00134	0.00625	5	11/20/2015 11:34	WG830459
2,2-Dichloropropane	U		0.00140	0.00625	5	11/20/2015 11:34	WG830459
Di-isopropyl ether	U		0.00124	0.00625	5	11/20/2015 11:34	WG830459
Ethylbenzene	U		0.00148	0.00625	5	11/20/2015 11:34	WG830459
Hexachloro-1,3-butadiene	U		0.00171	0.00625	5	11/20/2015 11:34	WG830459
Isopropylbenzene	U		0.00122	0.00625	5	11/20/2015 11:34	WG830459
p-Isopropyltoluene	U		0.00102	0.00625	5	11/20/2015 11:34	WG830459
2-Butanone (MEK)	U		0.0234	0.0625	5	11/20/2015 11:34	WG830459
Methylene Chloride	0.00703	J	0.00500	0.0312	5	11/20/2015 11:34	WG830459
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0625	5	11/20/2015 11:34	WG830459
Methyl tert-butyl ether	U		0.00106	0.00625	5	11/20/2015 11:34	WG830459
Naphthalene	U		0.00500	0.0312	5	11/20/2015 11:34	WG830459
n-Propylbenzene	U		0.00103	0.00625	5	11/20/2015 11:34	WG830459
Styrene	U		0.00117	0.00625	5	11/20/2015 11:34	WG830459
1,1,1,2-Tetrachloroethane	U		0.00132	0.00625	5	11/20/2015 11:34	WG830459

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00625	5	11/20/2015 11:34	WG830459
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00625	5	11/20/2015 11:34	WG830459
Tetrachloroethene	U		0.00138	0.00625	5	11/20/2015 11:34	WG830459
Toluene	U		0.00217	0.0312	5	11/20/2015 11:34	WG830459
1,2,3-Trichlorobenzene	U		0.00153	0.00625	5	11/20/2015 11:34	WG830459
1,2,4-Trichlorobenzene	U		0.00194	0.00625	5	11/20/2015 11:34	WG830459
1,1,1-Trichloroethane	U		0.00143	0.00625	5	11/20/2015 11:34	WG830459
1,1,2-Trichloroethane	U		0.00138	0.00625	5	11/20/2015 11:34	WG830459
Trichloroethene	U		0.00140	0.00625	5	11/20/2015 11:34	WG830459
Trichlorofluoromethane	U		0.00191	0.0312	5	11/20/2015 11:34	WG830459
1,2,3-Trichloropropane	U		0.00370	0.0156	5	11/20/2015 11:34	WG830459
1,2,4-Trimethylbenzene	U		0.00106	0.00625	5	11/20/2015 11:34	WG830459
1,2,3-Trimethylbenzene	U		0.00144	0.00625	5	11/20/2015 11:34	WG830459
1,3,5-Trimethylbenzene	U		0.00133	0.00625	5	11/20/2015 11:34	WG830459
Vinyl chloride	U		0.00146	0.00625	5	11/20/2015 11:34	WG830459
Xylenes, Total	U		0.00349	0.0187	5	11/20/2015 11:34	WG830459
(S) Toluene-d8	*103*			*88.7-115*		*11/20/2015 11:34*	WG830459
(S) Dibromofluoromethane	*102*			*76.3-123*		*11/20/2015 11:34*	WG830459
(S) 4-Bromofluorobenzene	*94.3*			*69.7-129*		*11/20/2015 11:34*	WG830459

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/18/2015 15:30	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:47	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:42	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:42	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:42	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:42	WG829919
Nickel,Dissolved	0.00752	J	0.00490	0.0100	1	11/18/2015 22:42	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:42	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:42	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:42	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000457	J	0.000210	0.00200	1	11/20/2015 00:59	WG829833
Arsenic,Dissolved	0.000928	J	0.000250	0.00200	1	11/20/2015 00:59	WG829833
Lead,Dissolved	0.000263	J	0.000240	0.00200	1	11/20/2015 00:59	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 00:59	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 09:56	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 09:56	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 09:56	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 09:56	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 09:56	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 09:56	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 09:56	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 09:56	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 09:56	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 09:56	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 09:56	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 09:56	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 09:56	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 09:56	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 09:56	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 09:56	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 09:56	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 09:56	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 09:56	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 09:56	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 09:56	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 09:56	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 09:56	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 09:56	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 09:56	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 09:56	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 09:56	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 09:56	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 09:56	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 09:56	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 09:56	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 09:56	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 09:56	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 09:56	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 09:56	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 09:56	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 09:56	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 09:56	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 09:56	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 09:56	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 09:56	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 09:56	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 09:56	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 09:56	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 09:56	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 09:56	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 09:56	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 09:56	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 09:56	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 09:56	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 09:56	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 09:56	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 09:56	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 09:56	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 09:56	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 09:56	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 09:56	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 09:56	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 09:56	WG829042
Trichloroethene	0.000917	J	0.000398	0.00100	1	11/15/2015 09:56	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 09:56	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 09:56	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 09:56	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 09:56	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 09:56	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 09:56	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 09:56	WG829042
(S) Toluene-d8	*98.1*			*90.0-115*		*11/15/2015 09:56*	WG829042
(S) Dibromofluoromethane	*94.6*			*79.0-121*		*11/15/2015 09:56*	WG829042
(S) 4-Bromofluorobenzene	*97.3*			*80.1-120*		*11/15/2015 09:56*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	86.4		1	11/16/2015 08:57	WG829021

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	123		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.640	2.31	1	11/20/2015 08:26	WG830384

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.22		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-29 WG828925: 8.22 at 22.3c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.971		0.00280	0.0231	1	11/16/2015 13:29	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	1.27	J	0.750	2.31	1	11/20/2015 16:17	WG829835
Arsenic	15.1		0.650	2.31	1	11/20/2015 16:17	WG829835
Beryllium	0.561		0.0700	0.231	1	11/20/2015 16:17	WG829835
Cadmium	1.52		0.0700	0.579	1	11/20/2015 16:17	WG829835
Chromium	16.4		0.140	1.16	1	11/20/2015 16:17	WG829835
Copper	48.7		0.530	2.31	1	11/20/2015 16:17	WG829835
Lead	252		0.190	0.579	1	11/20/2015 16:17	WG829835
Nickel	17.4		0.490	2.31	1	11/20/2015 16:17	WG829835
Selenium	U		0.740	2.31	1	11/20/2015 16:17	WG829835
Silver	U		0.280	1.16	1	11/25/2015 12:54	WG830710
Thallium	U		0.650	2.31	1	11/20/2015 16:17	WG829835
Zinc	209		0.590	5.79	1	11/20/2015 16:17	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.9		1	11/16/2015 08:57	WG829021

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.309	5	11/17/2015 04:50	WG829033
Acrylonitrile	U		0.00895	0.0618	5	11/17/2015 04:50	WG829033
Benzene	U		0.00135	0.00618	5	11/17/2015 04:50	WG829033
Bromobenzene	U		0.00142	0.00618	5	11/17/2015 04:50	WG829033
Bromodichloromethane	U		0.00127	0.00618	5	11/17/2015 04:50	WG829033
Bromoform	U		0.00212	0.00618	5	11/17/2015 04:50	WG829033
Bromomethane	U		0.00670	0.0309	5	11/17/2015 04:50	WG829033
n-Butylbenzene	U		0.00129	0.00618	5	11/17/2015 04:50	WG829033
sec-Butylbenzene	U		0.00100	0.00618	5	11/17/2015 04:50	WG829033
tert-Butylbenzene	U		0.00103	0.00618	5	11/17/2015 04:50	WG829033
Carbon tetrachloride	U		0.00164	0.00618	5	11/17/2015 04:50	WG829033
Chlorobenzene	U		0.00106	0.00618	5	11/17/2015 04:50	WG829033
Chlorodibromomethane	U		0.00186	0.00618	5	11/17/2015 04:50	WG829033
Chloroethane	U		0.00473	0.0309	5	11/17/2015 04:50	WG829033
2-Chloroethyl vinyl ether	U		0.0117	0.309	5	11/17/2015 04:50	WG829033
Chloroform	U		0.00114	0.0309	5	11/17/2015 04:50	WG829033
Chloromethane	U		0.00188	0.0155	5	11/17/2015 04:50	WG829033
2-Chlorotoluene	U		0.00150	0.00618	5	11/17/2015 04:50	WG829033
4-Chlorotoluene	U		0.00120	0.00618	5	11/17/2015 04:50	WG829033
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0309	5	11/17/2015 04:50	WG829033
1,2-Dibromoethane	U		0.00172	0.00618	5	11/17/2015 04:50	WG829033
Dibromomethane	U		0.00191	0.00618	5	11/17/2015 04:50	WG829033
1,2-Dichlorobenzene	U		0.00152	0.00618	5	11/17/2015 04:50	WG829033
1,3-Dichlorobenzene	U		0.00120	0.00618	5	11/17/2015 04:50	WG829033
1,4-Dichlorobenzene	U		0.00113	0.00618	5	11/17/2015 04:50	WG829033
Dichlorodifluoromethane	U		0.00356	0.0309	5	11/17/2015 04:50	WG829033
1,1-Dichloroethane	U		0.000995	0.00618	5	11/17/2015 04:50	WG829033
1,2-Dichloroethane	U		0.00132	0.00618	5	11/17/2015 04:50	WG829033
1,1-Dichloroethene	U		0.00152	0.00618	5	11/17/2015 04:50	WG829033
cis-1,2-Dichloroethene	U		0.00118	0.00618	5	11/17/2015 04:50	WG829033
trans-1,2-Dichloroethene	U		0.00132	0.00618	5	11/17/2015 04:50	WG829033
1,2-Dichloropropane	U		0.00179	0.00618	5	11/17/2015 04:50	WG829033
1,1-Dichloropropene	U		0.00158	0.00618	5	11/17/2015 04:50	WG829033
1,3-Dichloropropane	U		0.00104	0.00618	5	11/17/2015 04:50	WG829033
cis-1,3-Dichloropropene	U		0.00131	0.00618	5	11/17/2015 04:50	WG829033
trans-1,3-Dichloropropene	U		0.00134	0.00618	5	11/17/2015 04:50	WG829033
2,2-Dichloropropane	U		0.00140	0.00618	5	11/17/2015 04:50	WG829033
Di-isopropyl ether	U		0.00124	0.00618	5	11/17/2015 04:50	WG829033
Ethylbenzene	U		0.00148	0.00618	5	11/17/2015 04:50	WG829033
Hexachloro-1,3-butadiene	U		0.00171	0.00618	5	11/17/2015 04:50	WG829033
Isopropylbenzene	U		0.00122	0.00618	5	11/17/2015 04:50	WG829033
p-Isopropyltoluene	U		0.00102	0.00618	5	11/17/2015 04:50	WG829033
2-Butanone (MEK)	U		0.0234	0.0618	5	11/17/2015 04:50	WG829033
Methylene Chloride	U		0.00500	0.0309	5	11/17/2015 04:50	WG829033
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0618	5	11/17/2015 04:50	WG829033
Methyl tert-butyl ether	U		0.00106	0.00618	5	11/17/2015 04:50	WG829033
Naphthalene	U		0.00500	0.0309	5	11/17/2015 04:50	WG829033
n-Propylbenzene	U		0.00103	0.00618	5	11/17/2015 04:50	WG829033
Styrene	U		0.00117	0.00618	5	11/17/2015 04:50	WG829033
1,1,1,2-Tetrachloroethane	U		0.00132	0.00618	5	11/17/2015 04:50	WG829033

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00618	5	11/17/2015 04:50	WG829033
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00618	5	11/17/2015 04:50	WG829033
Tetrachloroethene	U		0.00138	0.00618	5	11/17/2015 04:50	WG829033
Toluene	U		0.00217	0.0309	5	11/17/2015 04:50	WG829033
1,2,3-Trichlorobenzene	U		0.00153	0.00618	5	11/17/2015 04:50	WG829033
1,2,4-Trichlorobenzene	U		0.00194	0.00618	5	11/17/2015 04:50	WG829033
1,1,1-Trichloroethane	U		0.00143	0.00618	5	11/17/2015 04:50	WG829033
1,1,2-Trichloroethane	U		0.00138	0.00618	5	11/17/2015 04:50	WG829033
Trichloroethene	U		0.00140	0.00618	5	11/17/2015 04:50	WG829033
Trichlorofluoromethane	U		0.00191	0.0309	5	11/17/2015 04:50	WG829033
1,2,3-Trichloropropane	U		0.00370	0.0155	5	11/17/2015 04:50	WG829033
1,2,4-Trimethylbenzene	U		0.00106	0.00618	5	11/17/2015 04:50	WG829033
1,2,3-Trimethylbenzene	U		0.00144	0.00618	5	11/17/2015 04:50	WG829033
1,3,5-Trimethylbenzene	U		0.00133	0.00618	5	11/17/2015 04:50	WG829033
Vinyl chloride	U		0.00146	0.00618	5	11/17/2015 04:50	WG829033
Xylenes, Total	U		0.00349	0.0186	5	11/17/2015 04:50	WG829033
(S) Toluene-d8	*102*			*88.7-115*		*11/17/2015 04:50*	WG829033
(S) Dibromofluoromethane	*96.0*			*76.3-123*		*11/17/2015 04:50*	WG829033
(S) 4-Bromofluorobenzene	*102*			*69.7-129*		*11/17/2015 04:50*	WG829033

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/18/2015 15:38	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:49	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:45	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:45	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:45	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:45	WG829919
Nickel,Dissolved	0.00577	J	0.00490	0.0100	1	11/18/2015 22:45	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:45	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:45	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:45	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000477	J	0.000210	0.00200	1	11/20/2015 01:01	WG829833
Arsenic,Dissolved	0.00405		0.000250	0.00200	1	11/20/2015 01:01	WG829833
Lead,Dissolved	U		0.000240	0.00200	1	11/20/2015 01:01	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 01:01	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 10:17	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 10:17	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 10:17	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 10:17	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 10:17	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 10:17	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 10:17	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 10:17	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 10:17	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 10:17	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 10:17	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 10:17	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 10:17	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 10:17	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 10:17	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 10:17	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 10:17	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 10:17	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 10:17	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 10:17	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 10:17	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 10:17	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 10:17	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 10:17	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 10:17	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 10:17	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 10:17	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 10:17	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 10:17	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 10:17	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 10:17	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 10:17	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 10:17	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 10:17	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 10:17	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 10:17	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 10:17	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 10:17	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 10:17	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 10:17	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 10:17	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 10:17	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 10:17	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 10:17	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 10:17	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 10:17	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 10:17	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 10:17	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 10:17	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 10:17	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 10:17	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 10:17	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 10:17	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 10:17	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 10:17	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 10:17	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 10:17	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 10:17	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 10:17	WG829042
Trichloroethene	0.000542	J	0.000398	0.00100	1	11/15/2015 10:17	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 10:17	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 10:17	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 10:17	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 10:17	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 10:17	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 10:17	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 10:17	WG829042
(S) Toluene-d8	*98.7*			*90.0-115*		*11/15/2015 10:17*	WG829042
(S) Dibromofluoromethane	*93.6*			*79.0-121*		*11/15/2015 10:17*	WG829042
(S) 4-Bromofluorobenzene	*93.3*			*80.1-120*		*11/15/2015 10:17*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	91.5		1	11/14/2015 15:27	WG829023

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	118		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.640	2.19	1	11/20/2015 08:28	WG830384

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.47		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-32 WG828925: 8.47 at 22.3c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	1.84		0.00560	0.0437	2	11/16/2015 14:05	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	0.897	J	0.750	2.19	1	11/20/2015 16:20	WG829835
Arsenic	11.8		0.650	2.19	1	11/20/2015 16:20	WG829835
Beryllium	0.427		0.0700	0.219	1	11/20/2015 16:20	WG829835
Cadmium	1.05		0.0700	0.546	1	11/20/2015 16:20	WG829835
Chromium	8.48		0.140	1.09	1	11/20/2015 16:20	WG829835
Copper	42.3		0.530	2.19	1	11/20/2015 16:20	WG829835
Lead	290		0.190	0.546	1	11/20/2015 16:20	WG829835
Nickel	7.36		0.490	2.19	1	11/20/2015 16:20	WG829835
Selenium	U		0.740	2.19	1	11/20/2015 16:20	WG829835
Silver	U		0.280	1.09	1	11/25/2015 12:57	WG830710
Thallium	U		0.650	2.19	1	11/20/2015 16:20	WG829835
Zinc	182		0.590	5.46	1	11/20/2015 16:20	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.6		1	11/14/2015 15:27	WG829023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.314	5	11/17/2015 09:07	WG829527
Acrylonitrile	U		0.00895	0.0628	5	11/17/2015 09:07	WG829527
Benzene	U		0.00135	0.00628	5	11/17/2015 09:07	WG829527
Bromobenzene	U		0.00142	0.00628	5	11/17/2015 09:07	WG829527
Bromodichloromethane	U		0.00127	0.00628	5	11/17/2015 09:07	WG829527
Bromoform	U		0.00212	0.00628	5	11/17/2015 09:07	WG829527
Bromomethane	U		0.00670	0.0314	5	11/17/2015 09:07	WG829527
n-Butylbenzene	U		0.00129	0.00628	5	11/17/2015 09:07	WG829527
sec-Butylbenzene	U		0.00100	0.00628	5	11/17/2015 09:07	WG829527
tert-Butylbenzene	U		0.00103	0.00628	5	11/17/2015 09:07	WG829527
Carbon tetrachloride	U		0.00164	0.00628	5	11/17/2015 09:07	WG829527
Chlorobenzene	U		0.00106	0.00628	5	11/17/2015 09:07	WG829527
Chlorodibromomethane	U		0.00186	0.00628	5	11/17/2015 09:07	WG829527
Chloroethane	U		0.00473	0.0314	5	11/17/2015 09:07	WG829527
2-Chloroethyl vinyl ether	U		0.0117	0.314	5	11/17/2015 09:07	WG829527
Chloroform	U		0.00114	0.0314	5	11/17/2015 09:07	WG829527
Chloromethane	U		0.00188	0.0157	5	11/17/2015 09:07	WG829527
2-Chlorotoluene	U		0.00150	0.00628	5	11/17/2015 09:07	WG829527
4-Chlorotoluene	U		0.00120	0.00628	5	11/17/2015 09:07	WG829527
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0314	5	11/17/2015 09:07	WG829527
1,2-Dibromoethane	U		0.00172	0.00628	5	11/17/2015 09:07	WG829527
Dibromomethane	U		0.00191	0.00628	5	11/17/2015 09:07	WG829527
1,2-Dichlorobenzene	U		0.00152	0.00628	5	11/17/2015 09:07	WG829527
1,3-Dichlorobenzene	U		0.00120	0.00628	5	11/17/2015 09:07	WG829527
1,4-Dichlorobenzene	U		0.00113	0.00628	5	11/17/2015 09:07	WG829527
Dichlorodifluoromethane	U		0.00356	0.0314	5	11/17/2015 09:07	WG829527
1,1-Dichloroethane	U		0.000995	0.00628	5	11/17/2015 09:07	WG829527
1,2-Dichloroethane	U		0.00132	0.00628	5	11/17/2015 09:07	WG829527
1,1-Dichloroethene	U		0.00152	0.00628	5	11/17/2015 09:07	WG829527
cis-1,2-Dichloroethene	U		0.00118	0.00628	5	11/17/2015 09:07	WG829527
trans-1,2-Dichloroethene	U		0.00132	0.00628	5	11/17/2015 09:07	WG829527
1,2-Dichloropropane	U		0.00179	0.00628	5	11/17/2015 09:07	WG829527
1,1-Dichloropropene	U		0.00158	0.00628	5	11/17/2015 09:07	WG829527
1,3-Dichloropropane	U		0.00104	0.00628	5	11/17/2015 09:07	WG829527
cis-1,3-Dichloropropene	U		0.00131	0.00628	5	11/17/2015 09:07	WG829527
trans-1,3-Dichloropropene	U		0.00134	0.00628	5	11/17/2015 09:07	WG829527
2,2-Dichloropropane	U		0.00140	0.00628	5	11/17/2015 09:07	WG829527
Di-isopropyl ether	U		0.00124	0.00628	5	11/17/2015 09:07	WG829527
Ethylbenzene	U		0.00148	0.00628	5	11/17/2015 09:07	WG829527
Hexachloro-1,3-butadiene	U		0.00171	0.00628	5	11/17/2015 09:07	WG829527
Isopropylbenzene	U		0.00122	0.00628	5	11/17/2015 09:07	WG829527
p-Isopropyltoluene	U		0.00102	0.00628	5	11/17/2015 09:07	WG829527
2-Butanone (MEK)	U		0.0234	0.0628	5	11/17/2015 09:07	WG829527
Methylene Chloride	U		0.00500	0.0314	5	11/17/2015 09:07	WG829527
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0628	5	11/17/2015 09:07	WG829527
Methyl tert-butyl ether	U		0.00106	0.00628	5	11/17/2015 09:07	WG829527
Naphthalene	U		0.00500	0.0314	5	11/17/2015 09:07	WG829527
n-Propylbenzene	U		0.00103	0.00628	5	11/17/2015 09:07	WG829527
Styrene	U		0.00117	0.00628	5	11/17/2015 09:07	WG829527
1,1,1,2-Tetrachloroethane	U		0.00132	0.00628	5	11/17/2015 09:07	WG829527

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00628	5	11/17/2015 09:07	WG829527
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00628	5	11/17/2015 09:07	WG829527
Tetrachloroethene	U		0.00138	0.00628	5	11/17/2015 09:07	WG829527
Toluene	U		0.00217	0.0314	5	11/17/2015 09:07	WG829527
1,2,3-Trichlorobenzene	U		0.00153	0.00628	5	11/17/2015 09:07	WG829527
1,2,4-Trichlorobenzene	U		0.00194	0.00628	5	11/17/2015 09:07	WG829527
1,1,1-Trichloroethane	U		0.00143	0.00628	5	11/17/2015 09:07	WG829527
1,1,2-Trichloroethane	U		0.00138	0.00628	5	11/17/2015 09:07	WG829527
Trichloroethene	U		0.00140	0.00628	5	11/17/2015 09:07	WG829527
Trichlorofluoromethane	U		0.00191	0.0314	5	11/17/2015 09:07	WG829527
1,2,3-Trichloropropane	U		0.00370	0.0157	5	11/17/2015 09:07	WG829527
1,2,4-Trimethylbenzene	0.00198	J	0.00106	0.00628	5	11/17/2015 09:07	WG829527
1,2,3-Trimethylbenzene	U		0.00144	0.00628	5	11/17/2015 09:07	WG829527
1,3,5-Trimethylbenzene	U		0.00133	0.00628	5	11/17/2015 09:07	WG829527
Vinyl chloride	U		0.00146	0.00628	5	11/17/2015 09:07	WG829527
Xylenes, Total	U		0.00349	0.0188	5	11/17/2015 09:07	WG829527
(S) Toluene-d8	*99.8*			*88.7-115*		*11/17/2015 09:07*	WG829527
(S) Dibromofluoromethane	*88.7*			*76.3-123*		*11/17/2015 09:07*	WG829527
(S) 4-Bromofluorobenzene	*101*			*69.7-129*		*11/17/2015 09:07*	WG829527

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	0.000200	J	0.000150	0.000500	1	11/18/2015 15:46	WG829647

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:51	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:48	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:48	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:48	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:48	WG829919
Nickel,Dissolved	U		0.00490	0.0100	1	11/18/2015 22:48	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:48	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:48	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:48	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000279	J	0.000210	0.00200	1	11/20/2015 01:04	WG829833
Arsenic,Dissolved	0.00130	J	0.000250	0.00200	1	11/20/2015 01:04	WG829833
Lead,Dissolved	0.000260	J	0.000240	0.00200	1	11/20/2015 01:04	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 01:04	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 10:38	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 10:38	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 10:38	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 10:38	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 10:38	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 10:38	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 10:38	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 10:38	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 10:38	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 10:38	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 10:38	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 10:38	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 10:38	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 10:38	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 10:38	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 10:38	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 10:38	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 10:38	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 10:38	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 10:38	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 10:38	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 10:38	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 10:38	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 10:38	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 10:38	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 10:38	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 10:38	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 10:38	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 10:38	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 10:38	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 10:38	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 10:38	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 10:38	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 10:38	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 10:38	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 10:38	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 10:38	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 10:38	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 10:38	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 10:38	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 10:38	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 10:38	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 10:38	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 10:38	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 10:38	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 10:38	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 10:38	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 10:38	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 10:38	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 10:38	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 10:38	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 10:38	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 10:38	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 10:38	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 10:38	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 10:38	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 10:38	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 10:38	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 10:38	WG829042
Trichloroethene	U		0.000398	0.00100	1	11/15/2015 10:38	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 10:38	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 10:38	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 10:38	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 10:38	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 10:38	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 10:38	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 10:38	WG829042
(S) Toluene-d8	*99.1*			*90.0-115*		*11/15/2015 10:38*	WG829042
(S) Dibromofluoromethane	*93.3*			*79.0-121*		*11/15/2015 10:38*	WG829042
(S) 4-Bromofluorobenzene	*95.0*			*80.1-120*		*11/15/2015 10:38*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	82.5		1	11/14/2015 15:28	WG829023

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	120		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	1.75	J	0.640	2.42	1	11/20/2015 08:30	WG830384

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.89		1	11/14/2015 11:16	WG828925

Sample Narrative:

9045D L800774-35 WG828925: 8.89 at 22.4c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.386		0.00280	0.0242	1	11/16/2015 13:34	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.42	1	11/20/2015 16:23	WG829835
Arsenic	10.1		0.650	2.42	1	11/20/2015 16:23	WG829835
Beryllium	0.493		0.0700	0.242	1	11/20/2015 16:23	WG829835
Cadmium	0.761		0.0700	0.606	1	11/20/2015 16:23	WG829835
Chromium	10.5		0.140	1.21	1	11/20/2015 16:23	WG829835
Copper	53.3		0.530	2.42	1	11/20/2015 16:23	WG829835
Lead	140		0.190	0.606	1	11/20/2015 16:23	WG829835
Nickel	10.6		0.490	2.42	1	11/20/2015 16:23	WG829835
Selenium	U		0.740	2.42	1	11/20/2015 16:23	WG829835
Silver	U		0.280	1.21	1	11/25/2015 13:00	WG830710
Thallium	U		0.650	2.42	1	11/20/2015 16:23	WG829835
Zinc	118		0.590	6.06	1	11/20/2015 16:23	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.2		1	11/14/2015 15:28	WG829023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.316	5	11/16/2015 09:22	WG829034
Acrylonitrile	U		0.00895	0.0631	5	11/16/2015 09:22	WG829034
Benzene	U		0.00135	0.00631	5	11/16/2015 09:22	WG829034
Bromobenzene	U		0.00142	0.00631	5	11/16/2015 09:22	WG829034
Bromodichloromethane	U		0.00127	0.00631	5	11/16/2015 09:22	WG829034
Bromoform	U		0.00212	0.00631	5	11/16/2015 09:22	WG829034
Bromomethane	U		0.00670	0.0316	5	11/16/2015 09:22	WG829034
n-Butylbenzene	U		0.00129	0.00631	5	11/16/2015 09:22	WG829034
sec-Butylbenzene	U		0.00100	0.00631	5	11/16/2015 09:22	WG829034
tert-Butylbenzene	U		0.00103	0.00631	5	11/16/2015 09:22	WG829034
Carbon tetrachloride	U		0.00164	0.00631	5	11/16/2015 09:22	WG829034
Chlorobenzene	U		0.00106	0.00631	5	11/16/2015 09:22	WG829034
Chlorodibromomethane	U		0.00186	0.00631	5	11/16/2015 09:22	WG829034
Chloroethane	U		0.00473	0.0316	5	11/16/2015 09:22	WG829034
2-Chloroethyl vinyl ether	U		0.0117	0.316	5	11/16/2015 09:22	WG829034
Chloroform	U		0.00114	0.0316	5	11/16/2015 09:22	WG829034
Chloromethane	U		0.00188	0.0158	5	11/16/2015 09:22	WG829034
2-Chlorotoluene	U		0.00150	0.00631	5	11/16/2015 09:22	WG829034
4-Chlorotoluene	U		0.00120	0.00631	5	11/16/2015 09:22	WG829034
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0316	5	11/16/2015 09:22	WG829034
1,2-Dibromoethane	U		0.00172	0.00631	5	11/16/2015 09:22	WG829034
Dibromomethane	U		0.00191	0.00631	5	11/16/2015 09:22	WG829034
1,2-Dichlorobenzene	U		0.00152	0.00631	5	11/16/2015 09:22	WG829034
1,3-Dichlorobenzene	U		0.00120	0.00631	5	11/16/2015 09:22	WG829034
1,4-Dichlorobenzene	U		0.00113	0.00631	5	11/16/2015 09:22	WG829034
Dichlorodifluoromethane	U		0.00356	0.0316	5	11/16/2015 09:22	WG829034
1,1-Dichloroethane	U		0.000995	0.00631	5	11/16/2015 09:22	WG829034
1,2-Dichloroethane	U		0.00132	0.00631	5	11/16/2015 09:22	WG829034
1,1-Dichloroethene	U		0.00152	0.00631	5	11/16/2015 09:22	WG829034
cis-1,2-Dichloroethene	U		0.00118	0.00631	5	11/16/2015 09:22	WG829034
trans-1,2-Dichloroethene	U		0.00132	0.00631	5	11/16/2015 09:22	WG829034
1,2-Dichloropropane	U		0.00179	0.00631	5	11/16/2015 09:22	WG829034
1,1-Dichloropropene	U		0.00158	0.00631	5	11/16/2015 09:22	WG829034
1,3-Dichloropropane	U		0.00104	0.00631	5	11/16/2015 09:22	WG829034
cis-1,3-Dichloropropene	U		0.00131	0.00631	5	11/16/2015 09:22	WG829034
trans-1,3-Dichloropropene	U		0.00134	0.00631	5	11/16/2015 09:22	WG829034
2,2-Dichloropropane	U		0.00140	0.00631	5	11/16/2015 09:22	WG829034
Di-isopropyl ether	U		0.00124	0.00631	5	11/16/2015 09:22	WG829034
Ethylbenzene	U		0.00148	0.00631	5	11/16/2015 09:22	WG829034
Hexachloro-1,3-butadiene	U		0.00171	0.00631	5	11/16/2015 09:22	WG829034
Isopropylbenzene	U		0.00122	0.00631	5	11/16/2015 09:22	WG829034
p-Isopropyltoluene	U		0.00102	0.00631	5	11/16/2015 09:22	WG829034
2-Butanone (MEK)	U		0.0234	0.0631	5	11/16/2015 09:22	WG829034
Methylene Chloride	U		0.00500	0.0316	5	11/16/2015 09:22	WG829034
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0631	5	11/16/2015 09:22	WG829034
Methyl tert-butyl ether	U		0.00106	0.00631	5	11/16/2015 09:22	WG829034
Naphthalene	U		0.00500	0.0316	5	11/16/2015 09:22	WG829034
n-Propylbenzene	U		0.00103	0.00631	5	11/16/2015 09:22	WG829034
Styrene	U		0.00117	0.00631	5	11/16/2015 09:22	WG829034
1,1,1,2-Tetrachloroethane	U		0.00132	0.00631	5	11/16/2015 09:22	WG829034

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00631	5	11/16/2015 09:22	WG829034
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00631	5	11/16/2015 09:22	WG829034
Tetrachloroethene	U		0.00138	0.00631	5	11/16/2015 09:22	WG829034
Toluene	U		0.00217	0.0316	5	11/16/2015 09:22	WG829034
1,2,3-Trichlorobenzene	U		0.00153	0.00631	5	11/16/2015 09:22	WG829034
1,2,4-Trichlorobenzene	U		0.00194	0.00631	5	11/16/2015 09:22	WG829034
1,1,1-Trichloroethane	U		0.00143	0.00631	5	11/16/2015 09:22	WG829034
1,1,2-Trichloroethane	U		0.00138	0.00631	5	11/16/2015 09:22	WG829034
Trichloroethene	U		0.00140	0.00631	5	11/16/2015 09:22	WG829034
Trichlorofluoromethane	U		0.00191	0.0316	5	11/16/2015 09:22	WG829034
1,2,3-Trichloropropane	U		0.00370	0.0158	5	11/16/2015 09:22	WG829034
1,2,4-Trimethylbenzene	U		0.00106	0.00631	5	11/16/2015 09:22	WG829034
1,2,3-Trimethylbenzene	U		0.00144	0.00631	5	11/16/2015 09:22	WG829034
1,3,5-Trimethylbenzene	U		0.00133	0.00631	5	11/16/2015 09:22	WG829034
Vinyl chloride	U		0.00146	0.00631	5	11/16/2015 09:22	WG829034
Xylenes, Total	U		0.00349	0.0189	5	11/16/2015 09:22	WG829034
(S) Toluene-d8	*99.5*			*88.7-115*		*11/16/2015 09:22*	WG829034
(S) Dibromofluoromethane	*91.1*			*76.3-123*		*11/16/2015 09:22*	WG829034
(S) 4-Bromofluorobenzene	*101*			*69.7-129*		*11/16/2015 09:22*	WG829034

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/24/2015 05:40	WG831270

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 11:58	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:51	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:51	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:51	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:51	WG829919
Nickel,Dissolved	U		0.00490	0.0100	1	11/18/2015 22:51	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:51	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:51	WG829919
Zinc,Dissolved	0.00704	J	0.00590	0.0500	1	11/18/2015 22:51	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.00112	J	0.000210	0.00200	1	11/20/2015 01:06	WG829833
Arsenic,Dissolved	0.00418		0.000250	0.00200	1	11/20/2015 01:06	WG829833
Lead,Dissolved	0.000274	J	0.000240	0.00200	1	11/20/2015 01:06	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 01:06	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 10:59	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 10:59	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 10:59	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 10:59	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 10:59	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 10:59	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 10:59	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 10:59	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 10:59	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 10:59	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 10:59	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 10:59	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 10:59	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 10:59	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 10:59	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 10:59	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 10:59	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 10:59	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 10:59	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 10:59	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 10:59	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 10:59	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 10:59	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 10:59	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 10:59	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 10:59	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 10:59	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 10:59	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 10:59	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 10:59	WG829042
cis-1,2-Dichloroethene	0.000367	J	0.000260	0.00100	1	11/15/2015 10:59	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 10:59	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 10:59	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 10:59	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 10:59	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 10:59	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 10:59	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 10:59	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 10:59	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 10:59	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 10:59	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 10:59	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 10:59	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 10:59	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 10:59	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 10:59	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 10:59	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 10:59	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 10:59	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 10:59	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 10:59	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 10:59	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 10:59	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 10:59	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 10:59	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 10:59	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 10:59	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 10:59	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 10:59	WG829042
Trichloroethene	U		0.000398	0.00100	1	11/15/2015 10:59	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 10:59	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 10:59	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 10:59	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 10:59	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 10:59	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 10:59	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 10:59	WG829042
(S) Toluene-d8	*98.4*			*90.0-115*		*11/15/2015 10:59*	WG829042
(S) Dibromofluoromethane	*91.9*			*79.0-121*		*11/15/2015 10:59*	WG829042
(S) 4-Bromofluorobenzene	*95.5*			*80.1-120*		*11/15/2015 10:59*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	78.0		1	11/14/2015 15:28	WG829023

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	119		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	7.18		0.640	2.56	1	11/20/2015 08:32	WG830384

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.13		1	11/14/2015 10:41	WG828928

Sample Narrative:

9045D L800774-38 WG828928: 8.13 at 21.5c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0570		0.00280	0.0256	1	11/16/2015 13:37	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.56	1	11/20/2015 16:26	WG829835
Arsenic	7.10		0.650	2.56	1	11/20/2015 16:26	WG829835
Beryllium	1.09		0.0700	0.256	1	11/20/2015 16:26	WG829835
Cadmium	0.657		0.0700	0.641	1	11/20/2015 16:26	WG829835
Chromium	22.2		0.140	1.28	1	11/20/2015 16:26	WG829835
Copper	43.6		0.530	2.56	1	11/20/2015 16:26	WG829835
Lead	44.0		0.190	0.641	1	11/20/2015 16:26	WG829835
Nickel	26.9		0.490	2.56	1	11/20/2015 16:26	WG829835
Selenium	U		0.740	2.56	1	11/20/2015 16:26	WG829835
Silver	U		0.280	1.28	1	11/25/2015 13:09	WG830710
Thallium	U		0.650	2.56	1	11/20/2015 16:26	WG829835
Zinc	109		0.590	6.41	1	11/20/2015 16:26	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.1		1	11/14/2015 15:28	WG829023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.312	5	11/17/2015 09:27	WG829527
Acrylonitrile	U		0.00895	0.0624	5	11/17/2015 09:27	WG829527
Benzene	U		0.00135	0.00624	5	11/17/2015 09:27	WG829527
Bromobenzene	U		0.00142	0.00624	5	11/17/2015 09:27	WG829527
Bromodichloromethane	U		0.00127	0.00624	5	11/17/2015 09:27	WG829527
Bromoform	U		0.00212	0.00624	5	11/17/2015 09:27	WG829527
Bromomethane	U		0.00670	0.0312	5	11/17/2015 09:27	WG829527
n-Butylbenzene	U		0.00129	0.00624	5	11/17/2015 09:27	WG829527
sec-Butylbenzene	U		0.00100	0.00624	5	11/17/2015 09:27	WG829527
tert-Butylbenzene	U		0.00103	0.00624	5	11/17/2015 09:27	WG829527
Carbon tetrachloride	U		0.00164	0.00624	5	11/17/2015 09:27	WG829527
Chlorobenzene	U		0.00106	0.00624	5	11/17/2015 09:27	WG829527
Chlorodibromomethane	U		0.00186	0.00624	5	11/17/2015 09:27	WG829527
Chloroethane	U		0.00473	0.0312	5	11/17/2015 09:27	WG829527
2-Chloroethyl vinyl ether	U		0.0117	0.312	5	11/17/2015 09:27	WG829527
Chloroform	U		0.00114	0.0312	5	11/17/2015 09:27	WG829527
Chloromethane	U		0.00188	0.0156	5	11/17/2015 09:27	WG829527
2-Chlorotoluene	U		0.00150	0.00624	5	11/17/2015 09:27	WG829527
4-Chlorotoluene	U		0.00120	0.00624	5	11/17/2015 09:27	WG829527
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0312	5	11/17/2015 09:27	WG829527
1,2-Dibromoethane	U		0.00172	0.00624	5	11/17/2015 09:27	WG829527
Dibromomethane	U		0.00191	0.00624	5	11/17/2015 09:27	WG829527
1,2-Dichlorobenzene	U		0.00152	0.00624	5	11/17/2015 09:27	WG829527
1,3-Dichlorobenzene	U		0.00120	0.00624	5	11/17/2015 09:27	WG829527
1,4-Dichlorobenzene	U		0.00113	0.00624	5	11/17/2015 09:27	WG829527
Dichlorodifluoromethane	U		0.00356	0.0312	5	11/17/2015 09:27	WG829527
1,1-Dichloroethane	U		0.000995	0.00624	5	11/17/2015 09:27	WG829527
1,2-Dichloroethane	U		0.00132	0.00624	5	11/17/2015 09:27	WG829527
1,1-Dichloroethene	U		0.00152	0.00624	5	11/17/2015 09:27	WG829527
cis-1,2-Dichloroethene	U		0.00118	0.00624	5	11/17/2015 09:27	WG829527
trans-1,2-Dichloroethene	U		0.00132	0.00624	5	11/17/2015 09:27	WG829527
1,2-Dichloropropane	U		0.00179	0.00624	5	11/17/2015 09:27	WG829527
1,1-Dichloropropene	U		0.00158	0.00624	5	11/17/2015 09:27	WG829527
1,3-Dichloropropane	U		0.00104	0.00624	5	11/17/2015 09:27	WG829527
cis-1,3-Dichloropropene	U		0.00131	0.00624	5	11/17/2015 09:27	WG829527
trans-1,3-Dichloropropene	U		0.00134	0.00624	5	11/17/2015 09:27	WG829527
2,2-Dichloropropane	U		0.00140	0.00624	5	11/17/2015 09:27	WG829527
Di-isopropyl ether	U		0.00124	0.00624	5	11/17/2015 09:27	WG829527
Ethylbenzene	U		0.00148	0.00624	5	11/17/2015 09:27	WG829527
Hexachloro-1,3-butadiene	U		0.00171	0.00624	5	11/17/2015 09:27	WG829527
Isopropylbenzene	U		0.00122	0.00624	5	11/17/2015 09:27	WG829527
p-Isopropyltoluene	U		0.00102	0.00624	5	11/17/2015 09:27	WG829527
2-Butanone (MEK)	U		0.0234	0.0624	5	11/17/2015 09:27	WG829527
Methylene Chloride	U		0.00500	0.0312	5	11/17/2015 09:27	WG829527
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0624	5	11/17/2015 09:27	WG829527
Methyl tert-butyl ether	U		0.00106	0.00624	5	11/17/2015 09:27	WG829527
Naphthalene	U		0.00500	0.0312	5	11/17/2015 09:27	WG829527
n-Propylbenzene	U		0.00103	0.00624	5	11/17/2015 09:27	WG829527
Styrene	U		0.00117	0.00624	5	11/17/2015 09:27	WG829527
1,1,1,2-Tetrachloroethane	U		0.00132	0.00624	5	11/17/2015 09:27	WG829527

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00624	5	11/17/2015 09:27	WG829527
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00624	5	11/17/2015 09:27	WG829527
Tetrachloroethene	U		0.00138	0.00624	5	11/17/2015 09:27	WG829527
Toluene	U		0.00217	0.0312	5	11/17/2015 09:27	WG829527
1,2,3-Trichlorobenzene	U		0.00153	0.00624	5	11/17/2015 09:27	WG829527
1,2,4-Trichlorobenzene	U		0.00194	0.00624	5	11/17/2015 09:27	WG829527
1,1,1-Trichloroethane	U		0.00143	0.00624	5	11/17/2015 09:27	WG829527
1,1,2-Trichloroethane	U		0.00138	0.00624	5	11/17/2015 09:27	WG829527
Trichloroethene	U		0.00140	0.00624	5	11/17/2015 09:27	WG829527
Trichlorofluoromethane	U		0.00191	0.0312	5	11/17/2015 09:27	WG829527
1,2,3-Trichloropropane	U		0.00370	0.0156	5	11/17/2015 09:27	WG829527
1,2,4-Trimethylbenzene	U		0.00106	0.00624	5	11/17/2015 09:27	WG829527
1,2,3-Trimethylbenzene	U		0.00144	0.00624	5	11/17/2015 09:27	WG829527
1,3,5-Trimethylbenzene	U		0.00133	0.00624	5	11/17/2015 09:27	WG829527
Vinyl chloride	U		0.00146	0.00624	5	11/17/2015 09:27	WG829527
Xylenes, Total	U		0.00349	0.0187	5	11/17/2015 09:27	WG829527
(S) Toluene-d8	*99.7*			*88.7-115*		*11/17/2015 09:27*	WG829527
(S) Dibromofluoromethane	*89.7*			*76.3-123*		*11/17/2015 09:27*	WG829527
(S) 4-Bromofluorobenzene	*103*			*69.7-129*		*11/17/2015 09:27*	WG829527

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/24/2015 06:05	WG831270

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 12:00	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:54	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 22:54	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 22:54	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 22:54	WG829919
Nickel,Dissolved	U		0.00490	0.0100	1	11/18/2015 22:54	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 22:54	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 22:54	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 22:54	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000428	J	0.000210	0.00200	1	11/20/2015 01:08	WG829833
Arsenic,Dissolved	0.00191	J	0.000250	0.00200	1	11/20/2015 01:08	WG829833
Lead,Dissolved	0.000255	J	0.000240	0.00200	1	11/20/2015 01:08	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 01:08	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 11:19	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 11:19	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 11:19	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 11:19	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 11:19	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 11:19	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 11:19	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 11:19	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 11:19	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 11:19	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 11:19	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 11:19	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 11:19	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 11:19	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 11:19	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 11:19	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 11:19	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 11:19	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 11:19	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 11:19	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 11:19	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 11:19	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 11:19	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 11:19	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 11:19	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 11:19	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 11:19	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 11:19	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 11:19	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 11:19	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 11:19	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 11:19	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 11:19	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 11:19	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 11:19	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 11:19	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 11:19	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 11:19	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 11:19	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 11:19	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 11:19	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 11:19	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 11:19	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 11:19	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 11:19	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 11:19	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 11:19	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 11:19	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 11:19	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 11:19	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 11:19	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 11:19	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 11:19	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 11:19	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 11:19	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 11:19	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 11:19	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 11:19	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 11:19	WG829042
Trichloroethene	U		0.000398	0.00100	1	11/15/2015 11:19	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 11:19	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 11:19	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 11:19	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 11:19	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 11:19	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 11:19	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 11:19	WG829042
(S) Toluene-d8	*100*			*90.0-115*		*11/15/2015 11:19*	WG829042
(S) Dibromofluoromethane	*96.1*			*79.0-121*		*11/15/2015 11:19*	WG829042
(S) 4-Bromofluorobenzene	*98.8*			*80.1-120*		*11/15/2015 11:19*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.3		1	11/14/2015 15:29	WG829023

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	111		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	2.65		0.640	2.52	1	11/20/2015 08:38	WG830384

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.83		1	11/14/2015 10:41	WG828928

Sample Narrative:

9045D L800774-41 WG828928: 8.83 at 21.0c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0440		0.00280	0.0252	1	11/16/2015 13:40	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.52	1	11/20/2015 16:30	WG829835
Arsenic	5.87		0.650	2.52	1	11/20/2015 16:30	WG829835
Beryllium	0.616		0.0700	0.252	1	11/20/2015 16:30	WG829835
Cadmium	0.426	J	0.0700	0.631	1	11/20/2015 16:30	WG829835
Chromium	11.1		0.140	1.26	1	11/20/2015 16:30	WG829835
Copper	41.0		0.530	2.52	1	11/20/2015 16:30	WG829835
Lead	45.2		0.190	0.631	1	11/20/2015 16:30	WG829835
Nickel	15.2		0.490	2.52	1	11/20/2015 16:30	WG829835
Selenium	U		0.740	2.52	1	11/20/2015 16:30	WG829835
Silver	U		0.280	1.26	1	11/25/2015 13:12	WG830710
Thallium	U		0.650	2.52	1	11/20/2015 16:30	WG829835
Zinc	64.0		0.590	6.31	1	11/20/2015 16:30	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	88.8		1	11/14/2015 15:29	WG829023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.282	5	11/16/2015 10:01	WG829034
Acrylonitrile	U		0.00895	0.0563	5	11/16/2015 10:01	WG829034
Benzene	U		0.00135	0.00563	5	11/16/2015 10:01	WG829034
Bromobenzene	U		0.00142	0.00563	5	11/16/2015 10:01	WG829034
Bromodichloromethane	U		0.00127	0.00563	5	11/16/2015 10:01	WG829034
Bromoform	U		0.00212	0.00563	5	11/16/2015 10:01	WG829034
Bromomethane	U		0.00670	0.0282	5	11/16/2015 10:01	WG829034
n-Butylbenzene	U		0.00129	0.00563	5	11/16/2015 10:01	WG829034
sec-Butylbenzene	U		0.00100	0.00563	5	11/16/2015 10:01	WG829034
tert-Butylbenzene	U		0.00103	0.00563	5	11/16/2015 10:01	WG829034
Carbon tetrachloride	U		0.00164	0.00563	5	11/16/2015 10:01	WG829034
Chlorobenzene	U		0.00106	0.00563	5	11/16/2015 10:01	WG829034
Chlorodibromomethane	U		0.00186	0.00563	5	11/16/2015 10:01	WG829034
Chloroethane	U		0.00473	0.0282	5	11/16/2015 10:01	WG829034
2-Chloroethyl vinyl ether	U		0.0117	0.282	5	11/16/2015 10:01	WG829034
Chloroform	U		0.00114	0.0282	5	11/16/2015 10:01	WG829034
Chloromethane	U		0.00188	0.0141	5	11/16/2015 10:01	WG829034
2-Chlorotoluene	U		0.00150	0.00563	5	11/16/2015 10:01	WG829034
4-Chlorotoluene	U		0.00120	0.00563	5	11/16/2015 10:01	WG829034
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0282	5	11/16/2015 10:01	WG829034
1,2-Dibromoethane	U		0.00172	0.00563	5	11/16/2015 10:01	WG829034
Dibromomethane	U		0.00191	0.00563	5	11/16/2015 10:01	WG829034
1,2-Dichlorobenzene	U		0.00152	0.00563	5	11/16/2015 10:01	WG829034
1,3-Dichlorobenzene	U		0.00120	0.00563	5	11/16/2015 10:01	WG829034
1,4-Dichlorobenzene	U		0.00113	0.00563	5	11/16/2015 10:01	WG829034
Dichlorodifluoromethane	U		0.00356	0.0282	5	11/16/2015 10:01	WG829034
1,1-Dichloroethane	U		0.000995	0.00563	5	11/16/2015 10:01	WG829034
1,2-Dichloroethane	U		0.00132	0.00563	5	11/16/2015 10:01	WG829034
1,1-Dichloroethene	U		0.00152	0.00563	5	11/16/2015 10:01	WG829034
cis-1,2-Dichloroethene	U		0.00118	0.00563	5	11/16/2015 10:01	WG829034
trans-1,2-Dichloroethene	U		0.00132	0.00563	5	11/16/2015 10:01	WG829034
1,2-Dichloropropane	U		0.00179	0.00563	5	11/16/2015 10:01	WG829034
1,1-Dichloropropene	U		0.00158	0.00563	5	11/16/2015 10:01	WG829034
1,3-Dichloropropane	U		0.00104	0.00563	5	11/16/2015 10:01	WG829034
cis-1,3-Dichloropropene	U		0.00131	0.00563	5	11/16/2015 10:01	WG829034
trans-1,3-Dichloropropene	U		0.00134	0.00563	5	11/16/2015 10:01	WG829034
2,2-Dichloropropane	U		0.00140	0.00563	5	11/16/2015 10:01	WG829034
Di-isopropyl ether	U		0.00124	0.00563	5	11/16/2015 10:01	WG829034
Ethylbenzene	U		0.00148	0.00563	5	11/16/2015 10:01	WG829034
Hexachloro-1,3-butadiene	U		0.00171	0.00563	5	11/16/2015 10:01	WG829034
Isopropylbenzene	U		0.00122	0.00563	5	11/16/2015 10:01	WG829034
p-Isopropyltoluene	U		0.00102	0.00563	5	11/16/2015 10:01	WG829034
2-Butanone (MEK)	U		0.0234	0.0563	5	11/16/2015 10:01	WG829034
Methylene Chloride	U		0.00500	0.0282	5	11/16/2015 10:01	WG829034
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0563	5	11/16/2015 10:01	WG829034
Methyl tert-butyl ether	U		0.00106	0.00563	5	11/16/2015 10:01	WG829034
Naphthalene	U		0.00500	0.0282	5	11/16/2015 10:01	WG829034
n-Propylbenzene	U		0.00103	0.00563	5	11/16/2015 10:01	WG829034
Styrene	U		0.00117	0.00563	5	11/16/2015 10:01	WG829034
1,1,1,2-Tetrachloroethane	U		0.00132	0.00563	5	11/16/2015 10:01	WG829034

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00563	5	11/16/2015 10:01	WG829034
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00563	5	11/16/2015 10:01	WG829034
Tetrachloroethene	U		0.00138	0.00563	5	11/16/2015 10:01	WG829034
Toluene	U		0.00217	0.0282	5	11/16/2015 10:01	WG829034
1,2,3-Trichlorobenzene	U		0.00153	0.00563	5	11/16/2015 10:01	WG829034
1,2,4-Trichlorobenzene	U		0.00194	0.00563	5	11/16/2015 10:01	WG829034
1,1,1-Trichloroethane	U		0.00143	0.00563	5	11/16/2015 10:01	WG829034
1,1,2-Trichloroethane	U		0.00138	0.00563	5	11/16/2015 10:01	WG829034
Trichloroethene	U		0.00140	0.00563	5	11/16/2015 10:01	WG829034
Trichlorofluoromethane	U		0.00191	0.0282	5	11/16/2015 10:01	WG829034
1,2,3-Trichloropropane	U		0.00370	0.0141	5	11/16/2015 10:01	WG829034
1,2,4-Trimethylbenzene	U		0.00106	0.00563	5	11/16/2015 10:01	WG829034
1,2,3-Trimethylbenzene	U		0.00144	0.00563	5	11/16/2015 10:01	WG829034
1,3,5-Trimethylbenzene	U		0.00133	0.00563	5	11/16/2015 10:01	WG829034
Vinyl chloride	U		0.00146	0.00563	5	11/16/2015 10:01	WG829034
Xylenes, Total	U		0.00349	0.0169	5	11/16/2015 10:01	WG829034
(S) Toluene-d8	*99.6*			*88.7-115*		*11/16/2015 10:01*	WG829034
(S) Dibromofluoromethane	*91.5*			*76.3-123*		*11/16/2015 10:01*	WG829034
(S) 4-Bromofluorobenzene	*103*			*69.7-129*		*11/16/2015 10:01*	WG829034

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/24/2015 06:13	WG831270

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 12:02	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 23:03	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 23:03	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 23:03	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 23:03	WG829919
Nickel,Dissolved	U		0.00490	0.0100	1	11/18/2015 23:03	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 23:03	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 23:03	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 23:03	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000991	J	0.000210	0.00200	1	11/20/2015 01:11	WG829833
Arsenic,Dissolved	0.00175	J	0.000250	0.00200	1	11/20/2015 01:11	WG829833
Lead,Dissolved	U		0.000240	0.00200	1	11/20/2015 01:11	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 01:11	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 11:39	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 11:39	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 11:39	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 11:39	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 11:39	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 11:39	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 11:39	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 11:39	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 11:39	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 11:39	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 11:39	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 11:39	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 11:39	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 11:39	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 11:39	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 11:39	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 11:39	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 11:39	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 11:39	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 11:39	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 11:39	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 11:39	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 11:39	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 11:39	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 11:39	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 11:39	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 11:39	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 11:39	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 11:39	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 11:39	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 11:39	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 11:39	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 11:39	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 11:39	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 11:39	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 11:39	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 11:39	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 11:39	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 11:39	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 11:39	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 11:39	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 11:39	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 11:39	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 11:39	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 11:39	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 11:39	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 11:39	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 11:39	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 11:39	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 11:39	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 11:39	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 11:39	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 11:39	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 11:39	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 11:39	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 11:39	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 11:39	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 11:39	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 11:39	WG829042
Trichloroethene	U		0.000398	0.00100	1	11/15/2015 11:39	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 11:39	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 11:39	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 11:39	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 11:39	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 11:39	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 11:39	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 11:39	WG829042
(S) Toluene-d8	*98.3*			*90.0-115*		*11/15/2015 11:39*	WG829042
(S) Dibromofluoromethane	*92.2*			*79.0-121*		*11/15/2015 11:39*	WG829042
(S) 4-Bromofluorobenzene	*92.3*			*80.1-120*		*11/15/2015 11:39*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.8		1	11/14/2015 15:29	WG829023

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	120		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	1.76	J	0.640	2.51	1	11/20/2015 08:41	WG830384

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.31		1	11/14/2015 10:41	WG828928

Sample Narrative:

9045D L800774-44 WG828928: 8.31 at 21.5c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0144	J	0.00280	0.0251	1	11/16/2015 13:42	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.51	1	11/20/2015 16:36	WG829835
Arsenic	5.05		0.650	2.51	1	11/20/2015 16:36	WG829835
Beryllium	0.860		0.0700	0.251	1	11/20/2015 16:36	WG829835
Cadmium	0.435	J	0.0700	0.627	1	11/20/2015 16:36	WG829835
Chromium	13.2		0.140	1.25	1	11/20/2015 16:36	WG829835
Copper	55.2		0.530	2.51	1	11/20/2015 16:36	WG829835
Lead	41.1		0.190	0.627	1	11/20/2015 16:36	WG829835
Nickel	16.1		0.490	2.51	1	11/20/2015 16:36	WG829835
Selenium	U		0.740	2.51	1	11/20/2015 16:36	WG829835
Silver	U		0.280	1.25	1	11/25/2015 13:15	WG830710
Thallium	U		0.650	2.51	1	11/20/2015 16:36	WG829835
Zinc	72.7		0.590	6.27	1	11/20/2015 16:36	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.6		1	11/14/2015 15:30	WG829023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.292	5	11/16/2015 10:20	WG829034
Acrylonitrile	U		0.00895	0.0584	5	11/16/2015 10:20	WG829034
Benzene	U		0.00135	0.00584	5	11/16/2015 10:20	WG829034
Bromobenzene	U		0.00142	0.00584	5	11/16/2015 10:20	WG829034
Bromodichloromethane	U		0.00127	0.00584	5	11/16/2015 10:20	WG829034
Bromoform	U		0.00212	0.00584	5	11/16/2015 10:20	WG829034
Bromomethane	U		0.00670	0.0292	5	11/16/2015 10:20	WG829034
n-Butylbenzene	U		0.00129	0.00584	5	11/16/2015 10:20	WG829034
sec-Butylbenzene	U		0.00100	0.00584	5	11/16/2015 10:20	WG829034
tert-Butylbenzene	U		0.00103	0.00584	5	11/16/2015 10:20	WG829034
Carbon tetrachloride	U		0.00164	0.00584	5	11/16/2015 10:20	WG829034
Chlorobenzene	U		0.00106	0.00584	5	11/16/2015 10:20	WG829034
Chlorodibromomethane	U		0.00186	0.00584	5	11/16/2015 10:20	WG829034
Chloroethane	U		0.00473	0.0292	5	11/16/2015 10:20	WG829034
2-Chloroethyl vinyl ether	U		0.0117	0.292	5	11/16/2015 10:20	WG829034
Chloroform	U		0.00114	0.0292	5	11/16/2015 10:20	WG829034
Chloromethane	U		0.00188	0.0146	5	11/16/2015 10:20	WG829034
2-Chlorotoluene	U		0.00150	0.00584	5	11/16/2015 10:20	WG829034
4-Chlorotoluene	U		0.00120	0.00584	5	11/16/2015 10:20	WG829034
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0292	5	11/16/2015 10:20	WG829034
1,2-Dibromoethane	U		0.00172	0.00584	5	11/16/2015 10:20	WG829034
Dibromomethane	U		0.00191	0.00584	5	11/16/2015 10:20	WG829034
1,2-Dichlorobenzene	U		0.00152	0.00584	5	11/16/2015 10:20	WG829034
1,3-Dichlorobenzene	U		0.00120	0.00584	5	11/16/2015 10:20	WG829034
1,4-Dichlorobenzene	U		0.00113	0.00584	5	11/16/2015 10:20	WG829034
Dichlorodifluoromethane	U		0.00356	0.0292	5	11/16/2015 10:20	WG829034
1,1-Dichloroethane	U		0.000995	0.00584	5	11/16/2015 10:20	WG829034
1,2-Dichloroethane	U		0.00132	0.00584	5	11/16/2015 10:20	WG829034
1,1-Dichloroethene	U		0.00152	0.00584	5	11/16/2015 10:20	WG829034
cis-1,2-Dichloroethene	U		0.00118	0.00584	5	11/16/2015 10:20	WG829034
trans-1,2-Dichloroethene	U		0.00132	0.00584	5	11/16/2015 10:20	WG829034
1,2-Dichloropropane	U		0.00179	0.00584	5	11/16/2015 10:20	WG829034
1,1-Dichloropropene	U		0.00158	0.00584	5	11/16/2015 10:20	WG829034
1,3-Dichloropropane	U		0.00104	0.00584	5	11/16/2015 10:20	WG829034
cis-1,3-Dichloropropene	U		0.00131	0.00584	5	11/16/2015 10:20	WG829034
trans-1,3-Dichloropropene	U		0.00134	0.00584	5	11/16/2015 10:20	WG829034
2,2-Dichloropropane	U		0.00140	0.00584	5	11/16/2015 10:20	WG829034
Di-isopropyl ether	U		0.00124	0.00584	5	11/16/2015 10:20	WG829034
Ethylbenzene	U		0.00148	0.00584	5	11/16/2015 10:20	WG829034
Hexachloro-1,3-butadiene	U		0.00171	0.00584	5	11/16/2015 10:20	WG829034
Isopropylbenzene	U		0.00122	0.00584	5	11/16/2015 10:20	WG829034
p-Isopropyltoluene	U		0.00102	0.00584	5	11/16/2015 10:20	WG829034
2-Butanone (MEK)	U		0.0234	0.0584	5	11/16/2015 10:20	WG829034
Methylene Chloride	U		0.00500	0.0292	5	11/16/2015 10:20	WG829034
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0584	5	11/16/2015 10:20	WG829034
Methyl tert-butyl ether	U		0.00106	0.00584	5	11/16/2015 10:20	WG829034
Naphthalene	U		0.00500	0.0292	5	11/16/2015 10:20	WG829034
n-Propylbenzene	U		0.00103	0.00584	5	11/16/2015 10:20	WG829034
Styrene	U		0.00117	0.00584	5	11/16/2015 10:20	WG829034
1,1,1,2-Tetrachloroethane	U		0.00132	0.00584	5	11/16/2015 10:20	WG829034

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00584	5	11/16/2015 10:20	WG829034
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00584	5	11/16/2015 10:20	WG829034
Tetrachloroethene	U		0.00138	0.00584	5	11/16/2015 10:20	WG829034
Toluene	U		0.00217	0.0292	5	11/16/2015 10:20	WG829034
1,2,3-Trichlorobenzene	U		0.00153	0.00584	5	11/16/2015 10:20	WG829034
1,2,4-Trichlorobenzene	U		0.00194	0.00584	5	11/16/2015 10:20	WG829034
1,1,1-Trichloroethane	U		0.00143	0.00584	5	11/16/2015 10:20	WG829034
1,1,2-Trichloroethane	U		0.00138	0.00584	5	11/16/2015 10:20	WG829034
Trichloroethene	U		0.00140	0.00584	5	11/16/2015 10:20	WG829034
Trichlorofluoromethane	U		0.00191	0.0292	5	11/16/2015 10:20	WG829034
1,2,3-Trichloropropane	U		0.00370	0.0146	5	11/16/2015 10:20	WG829034
1,2,4-Trimethylbenzene	U		0.00106	0.00584	5	11/16/2015 10:20	WG829034
1,2,3-Trimethylbenzene	U		0.00144	0.00584	5	11/16/2015 10:20	WG829034
1,3,5-Trimethylbenzene	U		0.00133	0.00584	5	11/16/2015 10:20	WG829034
Vinyl chloride	U		0.00146	0.00584	5	11/16/2015 10:20	WG829034
Xylenes, Total	U		0.00349	0.0175	5	11/16/2015 10:20	WG829034
(S) Toluene-d8	*101*			*88.7-115*		*11/16/2015 10:20*	WG829034
(S) Dibromofluoromethane	*91.8*			*76.3-123*		*11/16/2015 10:20*	WG829034
(S) 4-Bromofluorobenzene	*102*			*69.7-129*		*11/16/2015 10:20*	WG829034

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/24/2015 06:29	WG831270

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 12:05	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 23:06	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 23:06	WG829919
Chromium,Dissolved	U		0.00140	0.0100	1	11/18/2015 23:06	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 23:06	WG829919
Nickel,Dissolved	U		0.00490	0.0100	1	11/18/2015 23:06	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 23:06	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 23:06	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 23:06	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	0.000819	J	0.000210	0.00200	1	11/20/2015 01:13	WG829833
Arsenic,Dissolved	0.00160	J	0.000250	0.00200	1	11/20/2015 01:13	WG829833
Lead,Dissolved	U		0.000240	0.00200	1	11/20/2015 01:13	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 01:13	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 12:00	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 12:00	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 12:00	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 12:00	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 12:00	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 12:00	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 12:00	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 12:00	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 12:00	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 12:00	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 12:00	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 12:00	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 12:00	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 12:00	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 12:00	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 12:00	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 12:00	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 12:00	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 12:00	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 12:00	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 12:00	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 12:00	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 12:00	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 12:00	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 12:00	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 12:00	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 12:00	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 12:00	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 12:00	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 12:00	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 12:00	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 12:00	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 12:00	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 12:00	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 12:00	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 12:00	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 12:00	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 12:00	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 12:00	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 12:00	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 12:00	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 12:00	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 12:00	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 12:00	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 12:00	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 12:00	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 12:00	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 12:00	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 12:00	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 12:00	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 12:00	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 12:00	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 12:00	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 12:00	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 12:00	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 12:00	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 12:00	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 12:00	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 12:00	WG829042
Trichloroethene	0.00719		0.000398	0.00100	1	11/15/2015 12:00	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 12:00	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 12:00	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 12:00	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 12:00	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 12:00	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 12:00	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 12:00	WG829042
(S) Toluene-d8	*96.7*			*90.0-115*		*11/15/2015 12:00*	WG829042
(S) Dibromofluoromethane	*94.3*			*79.0-121*		*11/15/2015 12:00*	WG829042
(S) 4-Bromofluorobenzene	*95.9*			*80.1-120*		*11/15/2015 12:00*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	81.6		1	11/14/2015 15:23	WG829024

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	116		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	2.06	J	0.640	2.45	1	11/20/2015 08:45	WG830384

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.31		1	11/14/2015 10:41	WG828928

Sample Narrative:

9045D L800774-47 WG828928: 8.31 at 21.2c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.301		0.00280	0.0245	1	11/16/2015 13:45	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.750	2.45	1	11/20/2015 16:39	WG829835
Arsenic	17.8		0.650	2.45	1	11/20/2015 16:39	WG829835
Beryllium	0.641		0.0700	0.245	1	11/20/2015 16:39	WG829835
Cadmium	0.593	J	0.0700	0.613	1	11/20/2015 16:39	WG829835
Chromium	14.1		0.140	1.23	1	11/20/2015 16:39	WG829835
Copper	44.6		0.530	2.45	1	11/20/2015 16:39	WG829835
Lead	79.8		0.190	0.613	1	11/20/2015 16:39	WG829835
Nickel	13.7		0.490	2.45	1	11/20/2015 16:39	WG829835
Selenium	U		0.740	2.45	1	11/20/2015 16:39	WG829835
Silver	U		0.280	1.23	1	11/25/2015 13:19	WG830710
Thallium	U		0.650	2.45	1	11/20/2015 16:39	WG829835
Zinc	121		0.590	6.13	1	11/20/2015 16:39	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	81.0		1	11/14/2015 15:24	WG829024

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.309	5	11/16/2015 08:44	WG829034
Acrylonitrile	U		0.00895	0.0617	5	11/16/2015 08:44	WG829034
Benzene	U		0.00135	0.00617	5	11/16/2015 08:44	WG829034
Bromobenzene	U		0.00142	0.00617	5	11/16/2015 08:44	WG829034
Bromodichloromethane	U		0.00127	0.00617	5	11/16/2015 08:44	WG829034
Bromoform	U		0.00212	0.00617	5	11/16/2015 08:44	WG829034
Bromomethane	U		0.00670	0.0309	5	11/16/2015 08:44	WG829034
n-Butylbenzene	U		0.00129	0.00617	5	11/16/2015 08:44	WG829034
sec-Butylbenzene	U		0.00100	0.00617	5	11/16/2015 08:44	WG829034
tert-Butylbenzene	U		0.00103	0.00617	5	11/16/2015 08:44	WG829034
Carbon tetrachloride	U		0.00164	0.00617	5	11/16/2015 08:44	WG829034
Chlorobenzene	U		0.00106	0.00617	5	11/16/2015 08:44	WG829034
Chlorodibromomethane	U		0.00186	0.00617	5	11/16/2015 08:44	WG829034
Chloroethane	U		0.00473	0.0309	5	11/16/2015 08:44	WG829034
2-Chloroethyl vinyl ether	U		0.0117	0.309	5	11/16/2015 08:44	WG829034
Chloroform	U		0.00114	0.0309	5	11/16/2015 08:44	WG829034
Chloromethane	U		0.00188	0.0154	5	11/16/2015 08:44	WG829034
2-Chlorotoluene	U		0.00150	0.00617	5	11/16/2015 08:44	WG829034
4-Chlorotoluene	U		0.00120	0.00617	5	11/16/2015 08:44	WG829034
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0309	5	11/16/2015 08:44	WG829034
1,2-Dibromoethane	U		0.00172	0.00617	5	11/16/2015 08:44	WG829034
Dibromomethane	U		0.00191	0.00617	5	11/16/2015 08:44	WG829034
1,2-Dichlorobenzene	U		0.00152	0.00617	5	11/16/2015 08:44	WG829034
1,3-Dichlorobenzene	U		0.00120	0.00617	5	11/16/2015 08:44	WG829034
1,4-Dichlorobenzene	U		0.00113	0.00617	5	11/16/2015 08:44	WG829034
Dichlorodifluoromethane	U		0.00356	0.0309	5	11/16/2015 08:44	WG829034
1,1-Dichloroethane	U		0.000995	0.00617	5	11/16/2015 08:44	WG829034
1,2-Dichloroethane	U		0.00132	0.00617	5	11/16/2015 08:44	WG829034
1,1-Dichloroethene	U		0.00152	0.00617	5	11/16/2015 08:44	WG829034
cis-1,2-Dichloroethene	U		0.00118	0.00617	5	11/16/2015 08:44	WG829034
trans-1,2-Dichloroethene	U		0.00132	0.00617	5	11/16/2015 08:44	WG829034
1,2-Dichloropropane	U		0.00179	0.00617	5	11/16/2015 08:44	WG829034
1,1-Dichloropropene	U		0.00158	0.00617	5	11/16/2015 08:44	WG829034
1,3-Dichloropropane	U		0.00104	0.00617	5	11/16/2015 08:44	WG829034
cis-1,3-Dichloropropene	U		0.00131	0.00617	5	11/16/2015 08:44	WG829034
trans-1,3-Dichloropropene	U		0.00134	0.00617	5	11/16/2015 08:44	WG829034
2,2-Dichloropropane	U		0.00140	0.00617	5	11/16/2015 08:44	WG829034
Di-isopropyl ether	U		0.00124	0.00617	5	11/16/2015 08:44	WG829034
Ethylbenzene	U		0.00148	0.00617	5	11/16/2015 08:44	WG829034
Hexachloro-1,3-butadiene	U		0.00171	0.00617	5	11/16/2015 08:44	WG829034
Isopropylbenzene	U		0.00122	0.00617	5	11/16/2015 08:44	WG829034
p-Isopropyltoluene	U		0.00102	0.00617	5	11/16/2015 08:44	WG829034
2-Butanone (MEK)	U		0.0234	0.0617	5	11/16/2015 08:44	WG829034
Methylene Chloride	U		0.00500	0.0309	5	11/16/2015 08:44	WG829034
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0617	5	11/16/2015 08:44	WG829034
Methyl tert-butyl ether	U		0.00106	0.00617	5	11/16/2015 08:44	WG829034
Naphthalene	U		0.00500	0.0309	5	11/16/2015 08:44	WG829034
n-Propylbenzene	U		0.00103	0.00617	5	11/16/2015 08:44	WG829034
Styrene	U		0.00117	0.00617	5	11/16/2015 08:44	WG829034
1,1,1,2-Tetrachloroethane	U		0.00132	0.00617	5	11/16/2015 08:44	WG829034

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00617	5	11/16/2015 08:44	WG829034
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00617	5	11/16/2015 08:44	WG829034
Tetrachloroethene	U		0.00138	0.00617	5	11/16/2015 08:44	WG829034
Toluene	U		0.00217	0.0309	5	11/16/2015 08:44	WG829034
1,2,3-Trichlorobenzene	U		0.00153	0.00617	5	11/16/2015 08:44	WG829034
1,2,4-Trichlorobenzene	U		0.00194	0.00617	5	11/16/2015 08:44	WG829034
1,1,1-Trichloroethane	U		0.00143	0.00617	5	11/16/2015 08:44	WG829034
1,1,2-Trichloroethane	U		0.00138	0.00617	5	11/16/2015 08:44	WG829034
Trichloroethene	U		0.00140	0.00617	5	11/16/2015 08:44	WG829034
Trichlorofluoromethane	U		0.00191	0.0309	5	11/16/2015 08:44	WG829034
1,2,3-Trichloropropane	U		0.00370	0.0154	5	11/16/2015 08:44	WG829034
1,2,4-Trimethylbenzene	U		0.00106	0.00617	5	11/16/2015 08:44	WG829034
1,2,3-Trimethylbenzene	U		0.00144	0.00617	5	11/16/2015 08:44	WG829034
1,3,5-Trimethylbenzene	U		0.00133	0.00617	5	11/16/2015 08:44	WG829034
Vinyl chloride	U		0.00146	0.00617	5	11/16/2015 08:44	WG829034
Xylenes, Total	U		0.00349	0.0185	5	11/16/2015 08:44	WG829034
(S) Toluene-d8	*101*			*88.7-115*		*11/16/2015 08:44*	WG829034
(S) Dibromofluoromethane	*91.8*			*76.3-123*		*11/16/2015 08:44*	WG829034
(S) 4-Bromofluorobenzene	*101*			*69.7-129*		*11/16/2015 08:44*	WG829034

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium	U		0.000150	0.000500	1	11/24/2015 06:54	WG831270

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	11/17/2015 12:07	WG828922

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	11/18/2015 23:09	WG829919
Cadmium,Dissolved	U		0.000700	0.00200	1	11/18/2015 23:09	WG829919
Chromium,Dissolved	0.00140	J	0.00140	0.0100	1	11/18/2015 23:09	WG829919
Copper,Dissolved	U		0.00530	0.0100	1	11/18/2015 23:09	WG829919
Nickel,Dissolved	0.00500	J	0.00490	0.0100	1	11/18/2015 23:09	WG829919
Selenium,Dissolved	U		0.00740	0.0100	1	11/18/2015 23:09	WG829919
Silver,Dissolved	U		0.00280	0.00500	1	11/18/2015 23:09	WG829919
Zinc,Dissolved	U		0.00590	0.0500	1	11/18/2015 23:09	WG829919

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	U		0.000210	0.00200	1	11/20/2015 01:15	WG829833
Arsenic,Dissolved	0.000941	J	0.000250	0.00200	1	11/20/2015 01:15	WG829833
Lead,Dissolved	U		0.000240	0.00200	1	11/20/2015 01:15	WG829833
Thallium,Dissolved	U		0.000190	0.00200	1	11/20/2015 01:15	WG829833

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/15/2015 12:21	WG829042
Acrolein	U		0.00887	0.0500	1	11/15/2015 12:21	WG829042
Acrylonitrile	U		0.00187	0.0100	1	11/15/2015 12:21	WG829042
Benzene	U		0.000331	0.00100	1	11/15/2015 12:21	WG829042
Bromobenzene	U		0.000352	0.00100	1	11/15/2015 12:21	WG829042
Bromodichloromethane	U		0.000380	0.00100	1	11/15/2015 12:21	WG829042
Bromoform	U		0.000469	0.00100	1	11/15/2015 12:21	WG829042
Bromomethane	U		0.000866	0.00500	1	11/15/2015 12:21	WG829042
n-Butylbenzene	U		0.000361	0.00100	1	11/15/2015 12:21	WG829042
sec-Butylbenzene	U		0.000365	0.00100	1	11/15/2015 12:21	WG829042
tert-Butylbenzene	U		0.000399	0.00100	1	11/15/2015 12:21	WG829042
Carbon tetrachloride	U		0.000379	0.00100	1	11/15/2015 12:21	WG829042
Chlorobenzene	U		0.000348	0.00100	1	11/15/2015 12:21	WG829042
Chlorodibromomethane	U		0.000327	0.00100	1	11/15/2015 12:21	WG829042
Chloroethane	U		0.000453	0.00500	1	11/15/2015 12:21	WG829042
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	11/15/2015 12:21	WG829042
Chloroform	U		0.000324	0.00500	1	11/15/2015 12:21	WG829042
Chloromethane	U		0.000276	0.00250	1	11/15/2015 12:21	WG829042
2-Chlorotoluene	U		0.000375	0.00100	1	11/15/2015 12:21	WG829042
4-Chlorotoluene	U		0.000351	0.00100	1	11/15/2015 12:21	WG829042
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/15/2015 12:21	WG829042
1,2-Dibromoethane	U		0.000381	0.00100	1	11/15/2015 12:21	WG829042
Dibromomethane	U		0.000346	0.00100	1	11/15/2015 12:21	WG829042
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/15/2015 12:21	WG829042

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/15/2015 12:21	WG829042
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/15/2015 12:21	WG829042
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/15/2015 12:21	WG829042
1,1-Dichloroethane	U		0.000259	0.00100	1	11/15/2015 12:21	WG829042
1,2-Dichloroethane	U		0.000361	0.00100	1	11/15/2015 12:21	WG829042
1,1-Dichloroethene	U		0.000398	0.00100	1	11/15/2015 12:21	WG829042
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/15/2015 12:21	WG829042
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/15/2015 12:21	WG829042
1,2-Dichloropropane	U		0.000306	0.00100	1	11/15/2015 12:21	WG829042
1,1-Dichloropropene	U		0.000352	0.00100	1	11/15/2015 12:21	WG829042
1,3-Dichloropropane	U		0.000366	0.00100	1	11/15/2015 12:21	WG829042
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/15/2015 12:21	WG829042
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/15/2015 12:21	WG829042
2,2-Dichloropropane	U		0.000321	0.00100	1	11/15/2015 12:21	WG829042
Di-isopropyl ether	U		0.000320	0.00100	1	11/15/2015 12:21	WG829042
Ethylbenzene	U		0.000384	0.00100	1	11/15/2015 12:21	WG829042
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/15/2015 12:21	WG829042
Isopropylbenzene	U		0.000326	0.00100	1	11/15/2015 12:21	WG829042
p-Isopropyltoluene	U		0.000350	0.00100	1	11/15/2015 12:21	WG829042
2-Butanone (MEK)	U		0.00393	0.0100	1	11/15/2015 12:21	WG829042
Methylene Chloride	U		0.00100	0.00500	1	11/15/2015 12:21	WG829042
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/15/2015 12:21	WG829042
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/15/2015 12:21	WG829042
Naphthalene	U		0.00100	0.00500	1	11/15/2015 12:21	WG829042
n-Propylbenzene	U		0.000349	0.00100	1	11/15/2015 12:21	WG829042
Styrene	U		0.000307	0.00100	1	11/15/2015 12:21	WG829042
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/15/2015 12:21	WG829042
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/15/2015 12:21	WG829042
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/15/2015 12:21	WG829042
Tetrachloroethene	U		0.000372	0.00100	1	11/15/2015 12:21	WG829042
Toluene	U		0.000780	0.00500	1	11/15/2015 12:21	WG829042
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/15/2015 12:21	WG829042
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/15/2015 12:21	WG829042
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/15/2015 12:21	WG829042
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/15/2015 12:21	WG829042
Trichloroethene	U		0.000398	0.00100	1	11/15/2015 12:21	WG829042
Trichlorofluoromethane	U		0.00120	0.00500	1	11/15/2015 12:21	WG829042
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/15/2015 12:21	WG829042
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/15/2015 12:21	WG829042
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/15/2015 12:21	WG829042
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/15/2015 12:21	WG829042
Vinyl chloride	U		0.000259	0.00100	1	11/15/2015 12:21	WG829042
Xylenes, Total	U		0.00106	0.00300	1	11/15/2015 12:21	WG829042
(S) Toluene-d8	*98.4*			*90.0-115*		*11/15/2015 12:21*	WG829042
(S) Dibromofluoromethane	*93.3*			*79.0-121*		*11/15/2015 12:21*	WG829042
(S) 4-Bromofluorobenzene	*95.1*			*80.1-120*		*11/15/2015 12:21*	WG829042

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	90.6		1	11/14/2015 15:24	WG829024

Wet Chemistry by Method 2580 B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	101		1	11/17/2015 17:06	WG829427

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	3.42	J6	0.640	2.21	1	11/20/2015 08:48	WG830384

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.60		1	11/14/2015 10:41	WG828928

Sample Narrative:

9045D L800774-50 WG828928: 8.60 at 21.4c

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	4.33		0.0280	0.221	10	11/16/2015 14:08	WG828916

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	1.42	J	0.750	2.21	1	11/20/2015 16:42	WG829835
Arsenic	12.6		0.650	2.21	1	11/20/2015 16:42	WG829835
Beryllium	0.527		0.0700	0.221	1	11/20/2015 16:42	WG829835
Cadmium	0.537	J	0.0700	0.552	1	11/20/2015 16:42	WG829835
Chromium	12.7		0.140	1.10	1	11/20/2015 16:42	WG829835
Copper	34.7		0.530	2.21	1	11/20/2015 16:42	WG829835
Lead	230		0.190	0.552	1	11/20/2015 16:42	WG829835
Nickel	7.59		0.490	2.21	1	11/20/2015 16:42	WG829835
Selenium	U		0.740	2.21	1	11/20/2015 16:42	WG829835
Silver	0.373	J	0.280	1.10	1	11/25/2015 12:05	WG830710
Thallium	U		0.650	2.21	1	11/20/2015 16:42	WG829835
Zinc	134		0.590	5.52	1	11/20/2015 16:42	WG829835

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	78.4		1	11/14/2015 15:24	WG829024

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0500	0.319	5	11/17/2015 09:46	WG829527
Acrylonitrile	U		0.00895	0.0637	5	11/17/2015 09:46	WG829527
Benzene	U		0.00135	0.00637	5	11/17/2015 09:46	WG829527
Bromobenzene	U		0.00142	0.00637	5	11/17/2015 09:46	WG829527
Bromodichloromethane	U		0.00127	0.00637	5	11/17/2015 09:46	WG829527
Bromoform	U		0.00212	0.00637	5	11/17/2015 09:46	WG829527
Bromomethane	U		0.00670	0.0319	5	11/17/2015 09:46	WG829527
n-Butylbenzene	U		0.00129	0.00637	5	11/17/2015 09:46	WG829527
sec-Butylbenzene	U		0.00100	0.00637	5	11/17/2015 09:46	WG829527
tert-Butylbenzene	U		0.00103	0.00637	5	11/17/2015 09:46	WG829527
Carbon tetrachloride	U		0.00164	0.00637	5	11/17/2015 09:46	WG829527
Chlorobenzene	U		0.00106	0.00637	5	11/17/2015 09:46	WG829527
Chlorodibromomethane	U		0.00186	0.00637	5	11/17/2015 09:46	WG829527
Chloroethane	U		0.00473	0.0319	5	11/17/2015 09:46	WG829527
2-Chloroethyl vinyl ether	U		0.0117	0.319	5	11/17/2015 09:46	WG829527
Chloroform	U		0.00114	0.0319	5	11/17/2015 09:46	WG829527
Chloromethane	U		0.00188	0.0159	5	11/17/2015 09:46	WG829527
2-Chlorotoluene	U		0.00150	0.00637	5	11/17/2015 09:46	WG829527
4-Chlorotoluene	U		0.00120	0.00637	5	11/17/2015 09:46	WG829527
1,2-Dibromo-3-Chloropropane	U		0.00525	0.0319	5	11/17/2015 09:46	WG829527
1,2-Dibromoethane	U		0.00172	0.00637	5	11/17/2015 09:46	WG829527
Dibromomethane	U		0.00191	0.00637	5	11/17/2015 09:46	WG829527
1,2-Dichlorobenzene	U		0.00152	0.00637	5	11/17/2015 09:46	WG829527
1,3-Dichlorobenzene	U		0.00120	0.00637	5	11/17/2015 09:46	WG829527
1,4-Dichlorobenzene	U		0.00113	0.00637	5	11/17/2015 09:46	WG829527
Dichlorodifluoromethane	U		0.00356	0.0319	5	11/17/2015 09:46	WG829527
1,1-Dichloroethane	U		0.000995	0.00637	5	11/17/2015 09:46	WG829527
1,2-Dichloroethane	U		0.00132	0.00637	5	11/17/2015 09:46	WG829527
1,1-Dichloroethene	U		0.00152	0.00637	5	11/17/2015 09:46	WG829527
cis-1,2-Dichloroethene	U		0.00118	0.00637	5	11/17/2015 09:46	WG829527
trans-1,2-Dichloroethene	U		0.00132	0.00637	5	11/17/2015 09:46	WG829527
1,2-Dichloropropane	U		0.00179	0.00637	5	11/17/2015 09:46	WG829527
1,1-Dichloropropene	U		0.00158	0.00637	5	11/17/2015 09:46	WG829527
1,3-Dichloropropane	U		0.00104	0.00637	5	11/17/2015 09:46	WG829527
cis-1,3-Dichloropropene	U		0.00131	0.00637	5	11/17/2015 09:46	WG829527
trans-1,3-Dichloropropene	U		0.00134	0.00637	5	11/17/2015 09:46	WG829527
2,2-Dichloropropane	U		0.00140	0.00637	5	11/17/2015 09:46	WG829527
Di-isopropyl ether	U		0.00124	0.00637	5	11/17/2015 09:46	WG829527
Ethylbenzene	U		0.00148	0.00637	5	11/17/2015 09:46	WG829527
Hexachloro-1,3-butadiene	U		0.00171	0.00637	5	11/17/2015 09:46	WG829527
Isopropylbenzene	U		0.00122	0.00637	5	11/17/2015 09:46	WG829527
p-Isopropyltoluene	U		0.00102	0.00637	5	11/17/2015 09:46	WG829527
2-Butanone (MEK)	U		0.0234	0.0637	5	11/17/2015 09:46	WG829527
Methylene Chloride	U		0.00500	0.0319	5	11/17/2015 09:46	WG829527
4-Methyl-2-pentanone (MIBK)	U		0.00940	0.0637	5	11/17/2015 09:46	WG829527
Methyl tert-butyl ether	U		0.00106	0.00637	5	11/17/2015 09:46	WG829527
Naphthalene	U		0.00500	0.0319	5	11/17/2015 09:46	WG829527
n-Propylbenzene	U		0.00103	0.00637	5	11/17/2015 09:46	WG829527
Styrene	U		0.00117	0.00637	5	11/17/2015 09:46	WG829527
1,1,1,2-Tetrachloroethane	U		0.00132	0.00637	5	11/17/2015 09:46	WG829527

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2,2-Tetrachloroethane	U		0.00182	0.00637	5	11/17/2015 09:46	WG829527
1,1,2-Trichlorotrifluoroethane	U		0.00182	0.00637	5	11/17/2015 09:46	WG829527
Tetrachloroethene	U		0.00138	0.00637	5	11/17/2015 09:46	WG829527
Toluene	U		0.00217	0.0319	5	11/17/2015 09:46	WG829527
1,2,3-Trichlorobenzene	U		0.00153	0.00637	5	11/17/2015 09:46	WG829527
1,2,4-Trichlorobenzene	U		0.00194	0.00637	5	11/17/2015 09:46	WG829527
1,1,1-Trichloroethane	U		0.00143	0.00637	5	11/17/2015 09:46	WG829527
1,1,2-Trichloroethane	U		0.00138	0.00637	5	11/17/2015 09:46	WG829527
Trichloroethene	U		0.00140	0.00637	5	11/17/2015 09:46	WG829527
Trichlorofluoromethane	U		0.00191	0.0319	5	11/17/2015 09:46	WG829527
1,2,3-Trichloropropane	U		0.00370	0.0159	5	11/17/2015 09:46	WG829527
1,2,4-Trimethylbenzene	U		0.00106	0.00637	5	11/17/2015 09:46	WG829527
1,2,3-Trimethylbenzene	U		0.00144	0.00637	5	11/17/2015 09:46	WG829527
1,3,5-Trimethylbenzene	U		0.00133	0.00637	5	11/17/2015 09:46	WG829527
Vinyl chloride	U		0.00146	0.00637	5	11/17/2015 09:46	WG829527
Xylenes, Total	U		0.00349	0.0191	5	11/17/2015 09:46	WG829527
(S) Toluene-d8	*99.8*			*88.7-115*		*11/17/2015 09:46*	WG829527
(S) Dibromofluoromethane	*88.6*			*76.3-123*		*11/17/2015 09:46*	WG829527
(S) 4-Bromofluorobenzene	*100*			*69.7-129*		*11/17/2015 09:46*	WG829527

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	11/20/2015 12:06	WG830448
Acrolein	U		0.00887	0.0500	1	11/20/2015 12:06	WG830448
Acrylonitrile	U		0.00187	0.0100	1	11/20/2015 12:06	WG830448
Benzene	U		0.000331	0.00100	1	11/20/2015 12:06	WG830448
Bromobenzene	U		0.000352	0.00100	1	11/20/2015 12:06	WG830448
Bromodichloromethane	U		0.000380	0.00100	1	11/20/2015 12:06	WG830448
Bromoform	U		0.000469	0.00100	1	11/20/2015 12:06	WG830448
Bromomethane	U		0.000866	0.00500	1	11/20/2015 12:06	WG830448
n-Butylbenzene	U		0.000361	0.00100	1	11/20/2015 12:06	WG830448
sec-Butylbenzene	U		0.000365	0.00100	1	11/20/2015 12:06	WG830448
tert-Butylbenzene	U		0.000399	0.00100	1	11/20/2015 12:06	WG830448
Carbon tetrachloride	U		0.000379	0.00100	1	11/20/2015 12:06	WG830448
Chlorobenzene	U		0.000348	0.00100	1	11/20/2015 12:06	WG830448
Chlorodibromomethane	U		0.000327	0.00100	1	11/20/2015 12:06	WG830448
Chloroethane	U		0.000453	0.00500	1	11/20/2015 12:06	WG830448
2-Chloroethyl vinyl ether	U	J4	0.00301	0.0500	1	11/20/2015 12:06	WG830448
Chloroform	U		0.000324	0.00500	1	11/20/2015 12:06	WG830448
Chloromethane	U		0.000276	0.00250	1	11/20/2015 12:06	WG830448
2-Chlorotoluene	U		0.000375	0.00100	1	11/20/2015 12:06	WG830448
4-Chlorotoluene	U		0.000351	0.00100	1	11/20/2015 12:06	WG830448
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/20/2015 12:06	WG830448
1,2-Dibromoethane	U		0.000381	0.00100	1	11/20/2015 12:06	WG830448
Dibromomethane	U		0.000346	0.00100	1	11/20/2015 12:06	WG830448
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/20/2015 12:06	WG830448
1,3-Dichlorobenzene	U		0.000220	0.00100	1	11/20/2015 12:06	WG830448
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/20/2015 12:06	WG830448
Dichlorodifluoromethane	U		0.000551	0.00500	1	11/20/2015 12:06	WG830448
1,1-Dichloroethane	U		0.000259	0.00100	1	11/20/2015 12:06	WG830448
1,2-Dichloroethane	U		0.000361	0.00100	1	11/20/2015 12:06	WG830448
1,1-Dichloroethene	U		0.000398	0.00100	1	11/20/2015 12:06	WG830448
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/20/2015 12:06	WG830448
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/20/2015 12:06	WG830448
1,2-Dichloropropane	U		0.000306	0.00100	1	11/20/2015 12:06	WG830448
1,1-Dichloropropene	U		0.000352	0.00100	1	11/20/2015 12:06	WG830448
1,3-Dichloropropane	U		0.000366	0.00100	1	11/20/2015 12:06	WG830448
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/20/2015 12:06	WG830448
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/20/2015 12:06	WG830448
2,2-Dichloropropane	U		0.000321	0.00100	1	11/20/2015 12:06	WG830448
Di-isopropyl ether	U		0.000320	0.00100	1	11/20/2015 12:06	WG830448
Ethylbenzene	U		0.000384	0.00100	1	11/20/2015 12:06	WG830448
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	11/20/2015 12:06	WG830448
Isopropylbenzene	U		0.000326	0.00100	1	11/20/2015 12:06	WG830448
p-Isopropyltoluene	U		0.000350	0.00100	1	11/20/2015 12:06	WG830448
2-Butanone (MEK)	U		0.00393	0.0100	1	11/20/2015 12:06	WG830448
Methylene Chloride	0.00163	J	0.00100	0.00500	1	11/20/2015 12:06	WG830448
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/20/2015 12:06	WG830448
Methyl tert-butyl ether	U		0.000367	0.00100	1	11/20/2015 12:06	WG830448
Naphthalene	U		0.00100	0.00500	1	11/20/2015 12:06	WG830448
n-Propylbenzene	U		0.000349	0.00100	1	11/20/2015 12:06	WG830448
Styrene	U		0.000307	0.00100	1	11/20/2015 12:06	WG830448
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/20/2015 12:06	WG830448
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/20/2015 12:06	WG830448
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	11/20/2015 12:06	WG830448
Tetrachloroethene	U		0.000372	0.00100	1	11/20/2015 12:06	WG830448
Toluene	U		0.000780	0.00500	1	11/20/2015 12:06	WG830448
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	11/20/2015 12:06	WG830448

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	11/20/2015 12:06	WG830448
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/20/2015 12:06	WG830448
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/20/2015 12:06	WG830448
Trichloroethene	U		0.000398	0.00100	1	11/20/2015 12:06	WG830448
Trichlorofluoromethane	U		0.00120	0.00500	1	11/20/2015 12:06	WG830448
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/20/2015 12:06	WG830448
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	11/20/2015 12:06	WG830448
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	11/20/2015 12:06	WG830448
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	11/20/2015 12:06	WG830448
Vinyl chloride	U		0.000259	0.00100	1	11/20/2015 12:06	WG830448
Xylenes, Total	U		0.00106	0.00300	1	11/20/2015 12:06	WG830448
(S) Toluene-d8	*105*			*90.0-115*		*11/20/2015 12:06*	WG830448
(S) Dibromofluoromethane	*108*			*79.0-121*		*11/20/2015 12:06*	WG830448
(S) 4-Bromofluorobenzene	*101*			*80.1-120*		*11/20/2015 12:06*	WG830448

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 17:01	WG831352
(S) Toluene-d8	*103*			*70.0-130*		*11/24/2015 17:01*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.4		1	11/16/2015 09:00	WG829020

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0124	5	11/25/2015 17:21	WG831367
(S) Toluene-d8	*104*			*70.0-130*		*11/25/2015 17:21*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 17:21	WG831352
(S) Toluene-d8	*103*			*70.0-130*		*11/24/2015 17:21*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	83.8		1	11/16/2015 09:01	WG829020

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0119	5	11/25/2015 17:41	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 17:41*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 17:40	WG831352
(S) Toluene-d8	*103*			*70.0-130*		*11/24/2015 17:40*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.3		1	11/16/2015 09:01	WG829020

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0126	5	11/25/2015 18:01	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 18:01*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 18:00	WG831352
(S) Toluene-d8	*101*			*70.0-130*		*11/24/2015 18:00*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.6		1	11/16/2015 09:02	WG829020

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0126	5	11/25/2015 18:20	WG831367
(S) Toluene-d8	*111*			*70.0-130*		*11/25/2015 18:20*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 18:19	WG831352
(S) Toluene-d8	*102*			*70.0-130*		*11/24/2015 18:19*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	81.9		1	11/16/2015 09:02	WG829020

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0122	5	11/25/2015 18:40	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 18:40*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 18:39	WG831352
(S) Toluene-d8	*101*			*70.0-130*		*11/24/2015 18:39*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	76.8		1	11/16/2015 08:55	WG829021

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0130	5	11/25/2015 18:59	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 18:59*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 18:58	WG831352
(S) Toluene-d8	*101*			*70.0-130*		*11/24/2015 18:58*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	81.5		1	11/16/2015 08:56	WG829021

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0123	5	11/25/2015 19:19	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 19:19*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/25/2015 10:02	WG831359
(S) Toluene-d8	*110*			*70.0-130*		*11/25/2015 10:02*	WG831359

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.8		1	11/16/2015 08:56	WG829021

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0124	5	11/25/2015 21:56	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 21:56*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/25/2015 10:21	WG831359
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 10:21*	WG831359

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.0		1	11/16/2015 08:57	WG829021

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0125	5	11/25/2015 22:15	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 22:15*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/25/2015 10:41	WG831359
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 10:41*	WG831359

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.8		1	11/16/2015 08:57	WG829021

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0124	5	11/25/2015 22:35	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 22:35*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/25/2015 11:00	WG831359
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 11:00*	WG831359

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.6		1	11/14/2015 15:27	WG829023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0126	5	11/25/2015 22:55	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 22:55*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/25/2015 11:20	WG831359
(S) Toluene-d8	*104*			*70.0-130*		*11/25/2015 11:20*	WG831359

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.2		1	11/14/2015 15:28	WG829023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0126	5	11/25/2015 23:15	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 23:15*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 19:18	WG831352
(S) Toluene-d8	*101*			*70.0-130*		*11/24/2015 19:18*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.1		1	11/14/2015 15:28	WG829023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0125	5	11/25/2015 19:39	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 19:39*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 19:37	WG831352
(S) Toluene-d8	*101*			*70.0-130*		*11/24/2015 19:37*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	88.8		1	11/14/2015 15:29	WG829023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0113	5	11/25/2015 19:58	WG831367
(S) Toluene-d8	*104*			*70.0-130*		*11/25/2015 19:58*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 19:57	WG831352
(S) Toluene-d8	*101*			*70.0-130*		*11/24/2015 19:57*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.6		1	11/14/2015 15:30	WG829023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0117	5	11/25/2015 20:17	WG831367
(S) Toluene-d8	*104*			*70.0-130*		*11/25/2015 20:17*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/24/2015 20:16	WG831352
(S) Toluene-d8	*100*			*70.0-130*		*11/24/2015 20:16*	WG831352

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	81.0		1	11/14/2015 15:24	WG829024

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0123	5	11/25/2015 20:37	WG831367
(S) Toluene-d8	*104*			*70.0-130*		*11/25/2015 20:37*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/25/2015 11:39	WG831359
(S) Toluene-d8	*104*			*70.0-130*		*11/25/2015 11:39*	WG831359

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	78.4		1	11/14/2015 15:24	WG829024

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
1,4-Dioxane	U		0.00186	0.0128	5	11/25/2015 23:34	WG831367
(S) Toluene-d8	*103*			*70.0-130*		*11/25/2015 23:34*	WG831367

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dioxane	U		0.000597	0.00300	1	11/25/2015 14:06	WG831359
(S) Toluene-d8	*104*			*70.0-130*		*11/25/2015 14:06*	WG831359

Method Blank (MB)

(MB) 11/16/15 09:00

Analyte	MB Result	MB Qualifier	MB RDL
	%		%
Total Solids	0.000300		

L800774-05 Original Sample (OS) • Duplicate (DUP)

(OS) 11/16/15 09:01 • (DUP) 11/16/15 09:01

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	%	%		%		%
Total Solids	79.9	79.5	1	0.432		5

Laboratory Control Sample (LCS)

(LCS) 11/16/15 09:00

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) 11/16/15 08:54

Analyte	MB Result	MB Qualifier	MB RDL
	%		%
Total Solids	0.000200		

L800774-30 Original Sample (OS) • Duplicate (DUP)

(OS) 11/16/15 08:57 • (DUP) 11/16/15 08:57

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	%	%		%		%
Total Solids	80.9	81.0	1	0.179		5

Laboratory Control Sample (LCS)

(LCS) 11/16/15 08:55

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) 11/14/15 15:27

Analyte	MB Result	MB Qualifier	MB RDL
	%		%
Total Solids	0.000500		

L800774-39 Original Sample (OS) • Duplicate (DUP)

(OS) 11/14/15 15:28 • (DUP) 11/14/15 15:28

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	%	%		%		%
Total Solids	80.1	80.0	1	0.0741		5

Laboratory Control Sample (LCS)

(LCS) 11/14/15 15:27

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) 11/14/15 15:23

Analyte	MB Result	MB Qualifier	MB RDL
	%		%
Total Solids	0.000900		

L800774-48 Original Sample (OS) • Duplicate (DUP)

(OS) 11/14/15 15:24 • (DUP) 11/14/15 15:24

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	%	%		%		%
Total Solids	81.0	81.5	1	0.596		5

Laboratory Control Sample (LCS)

(LCS) 11/14/15 15:23

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	%	%	%	%	
Total Solids	50.0	50.0	99.9	85.0-115	

L800774-02 Original Sample (OS) • Duplicate (DUP)

(OS) 11/17/15 17:06 • (DUP) 11/17/15 17:06

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mV	mV		%		%
ORP	148	149	1	0.673		20

L800788-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/17/15 17:06 • (DUP) 11/17/15 17:06

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mV	mV		%		%
ORP	130	130	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/17/15 17:06 • (LCSD) 11/17/15 17:06

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mV	mV	mV	%	%	%			%	%
ORP	100	94	94	94.0	94.0	90.0-110			0.000	20

Method Blank (MB)

(MB) 11/17/15 09:04

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chromium,Hexavalent	U		0.640	2.00

L800774-11 Original Sample (OS) • Duplicate (DUP)

(OS) 11/17/15 09:24 • (DUP) 11/17/15 09:24

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	15.0	15.1	1	0.664		20

L798279-03 Original Sample (OS) • Duplicate (DUP)

(OS) 11/17/15 09:15 • (DUP) 11/17/15 09:16

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	ND	ND	1	200		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/17/15 09:06 • (LCSD) 11/17/15 09:06

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	0.600	64.4	64.6	10700	10800	80.0-120			0.310	20

L800774-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/17/15 09:24 • (MS) 11/17/15 09:25 • (MSD) 11/17/15 09:25

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	0.500	15.0	20.3	20.3	1060	1060	1	75.0-125	J6	J6	0.000	20

Method Blank (MB)

(MB) 11/20/15 08:16

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chromium,Hexavalent	U		0.640	2.00

L800774-50 Original Sample (OS) • Duplicate (DUP)

(OS) 11/20/15 08:48 • (DUP) 11/20/15 08:49

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	3.10	2.96	1	4.62		20

L798915-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/20/15 08:23 • (DUP) 11/20/15 08:24

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	6.90	7.10	1	2.86		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/20/15 08:18 • (LCSD) 11/20/15 08:18

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	97.4	79.4	79.8	81.5	81.9	80.0-120			0.503	20

L800774-50 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/20/15 08:48 • (MS) 11/20/15 08:49 • (MSD) 11/20/15 08:50

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	20.0	3.10	6.20	6.20	15.5	15.5	1	75.0-125	J6	J6	0.000	20

Method Blank (MB)

(MB) 11/18/15 10:56

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hexavalent Chromium	U		0.000150	0.000500

L800759-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/18/15 12:45 • (DUP) 11/18/15 12:53

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hexavalent Chromium	0.000700	0.000700	1	0.000		20

L800774-07 Original Sample (OS) • Duplicate (DUP)

(OS) 11/18/15 14:21 • (DUP) 11/18/15 14:32

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hexavalent Chromium	ND	ND	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/18/15 11:15 • (LCSD) 11/18/15 11:23

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hexavalent Chromium	0.00200	0.00190	0.00190	95.0	95.0	90.0-110			0.000	20

L800100-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/18/15 12:04 • (MS) 11/18/15 12:12 • (MSD) 11/18/15 12:20

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Hexavalent Chromium	0.0500	0.000600	0.0531	0.0535	105	106	1	90.0-110			1.00	20

Method Blank (MB)

(MB) 11/24/15 03:14

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hexavalent Chromium	U		0.000150	0.000500

L801658-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/24/15 05:16 • (DUP) 11/24/15 05:24

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hexavalent Chromium	ND	ND	1	0.000		20

L800774-43 Original Sample (OS) • Duplicate (DUP)

(OS) 11/24/15 06:13 • (DUP) 11/24/15 06:21

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hexavalent Chromium	ND	ND	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/24/15 03:34 • (LCSD) 11/24/15 03:42

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hexavalent Chromium	0.00200	0.00190	0.00190	95.0	95.0	90.0-110			0.000	20

L800774-46 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/24/15 06:29 • (MS) 11/24/15 06:38 • (MSD) 11/24/15 06:46

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Hexavalent Chromium	0.0500	0.000100	0.0497	0.0466	99.0	93.0	1	90.0-110			6.00	20

L800770-01 Original Sample (OS) • Duplicate (DUP)

(OS) 11/14/15 11:16 • (DUP) 11/14/15 11:16

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.64	7.65	1	0.131		1

L800774-35 Original Sample (OS) • Duplicate (DUP)

(OS) 11/14/15 11:16 • (DUP) 11/14/15 11:16

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.89	8.89	1	0.000		1

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/14/15 11:16 • (LCSD) 11/14/15 11:16

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.72	6.71	6.71	99.9	99.9	98.5-102			0.000	1

L800774-38 Original Sample (OS) • Duplicate (DUP)

(OS) 11/14/15 10:41 • (DUP) 11/14/15 10:41

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.13	8.13	1	0.000		1

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/14/15 10:41 • (LCSD) 11/14/15 10:41

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.72	6.71	6.71	99.9	99.9	98.5-102			0.000	1

Method Blank (MB)

(MB) 11/17/15 11:11

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury,Dissolved	U		0.000049	0.000200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/17/15 11:13 • (LCSD) 11/17/15 11:16

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury,Dissolved	0.00300	0.00302	0.00303	101	101	80-120			1	20

L800774-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/17/15 11:18 • (MS) 11/17/15 11:20 • (MSD) 11/17/15 11:22

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury,Dissolved	0.00300	ND	0.00309	0.00306	103	102	1	75-125			1	20

Method Blank (MB)

(MB) 11/16/15 12:43

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	U		0.0028	0.0200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/16/15 12:45 • (LCSD) 11/16/15 12:48

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	0.271	0.270	90	90	80-120			1	20

L800774-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/16/15 12:56 • (MS) 11/16/15 12:58 • (MSD) 11/16/15 13:01

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	0.0193	0.306	0.311	95	97	1	75-125			2	20

Method Blank (MB)

(MB) 11/20/15 14:54

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Antimony	U		0.75	2.00
Arsenic	U		0.65	2.00
Beryllium	U		0.07	0.200
Cadmium	U		0.07	0.500
Chromium	U		0.14	1.00
Copper	U		0.53	2.00
Lead	U		0.19	0.500
Nickel	U		0.49	2.00
Selenium	U		0.74	2.00
Thallium	U		0.65	2.00
Zinc	0.738		0.59	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/20/15 14:57 • (LCSD) 11/20/15 15:00

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony	100	103	105	103	105	80-120			2	20
Arsenic	100	100	102	100	102	80-120			2	20
Beryllium	100	103	105	103	105	80-120			2	20
Cadmium	100	99.4	101	99	101	80-120			2	20
Chromium	100	99.4	101	99	101	80-120			2	20
Copper	100	103	104	103	104	80-120			1	20
Lead	100	101	103	101	103	80-120			2	20
Nickel	100	99.8	102	100	102	80-120			2	20
Selenium	100	104	106	104	106	80-120			3	20
Thallium	100	99.3	101	99	101	80-120			2	20
Zinc	100	100	102	100	102	80-120			2	20

L800774-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/20/15 15:03 • (MS) 11/20/15 15:37 • (MSD) 11/20/15 15:40

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	100	ND	87.7	79.1	88	79	1	75-125			10	20

L800774-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/20/15 15:03 • (MS) 11/20/15 15:37 • (MSD) 11/20/15 15:40

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	100	2.83	103	103	101	100	1	75-125			1	20
Beryllium	100	0.855	105	103	105	102	1	75-125			2	20
Cadmium	100	0.220	101	99.1	101	99	1	75-125			2	20
Chromium	100	10.3	106	107	96	97	1	75-125			1	20
Copper	100	43.7	143	144	99	100	1	75-125			1	20
Lead	100	28.3	132	133	104	104	1	75-125			0	20
Nickel	100	12.5	116	117	103	104	1	75-125			1	20
Selenium	100	0.156	102	102	102	102	1	75-125			1	20
Thallium	100	0.126	101	99.2	101	99	1	75-125			1	20
Zinc	100	66.7	156	170	89	103	1	75-125			9	20

Method Blank (MB)

(MB) 11/18/15 21:51

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Beryllium,Dissolved	U		0.0007	0.00200
Cadmium,Dissolved	U		0.0007	0.00200
Chromium,Dissolved	U		0.0014	0.0100
Copper,Dissolved	U		0.0053	0.0100
Nickel,Dissolved	U		0.0049	0.0100
Selenium,Dissolved	U		0.0074	0.0100
Silver,Dissolved	U		0.0028	0.00500
Zinc,Dissolved	U		0.0059	0.0500

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/18/15 21:54 • (LCSD) 11/18/15 21:57

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Beryllium,Dissolved	1.00	1.06	1.05	106	105	80-120			1	20
Cadmium,Dissolved	1.00	1.08	1.08	108	108	80-120			1	20
Chromium,Dissolved	1.00	1.05	1.05	105	105	80-120			1	20
Copper,Dissolved	1.00	1.05	1.04	105	104	80-120			1	20
Nickel,Dissolved	1.00	1.03	1.02	103	102	80-120			1	20
Selenium,Dissolved	1.00	1.11	1.10	111	110	80-120			1	20
Silver,Dissolved	1.00	1.03	1.02	103	102	80-120			1	20
Zinc,Dissolved	1.00	1.01	1.01	101	101	80-120			1	20

L800774-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/18/15 22:00 • (MS) 11/18/15 22:06 • (MSD) 11/18/15 22:08

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Beryllium,Dissolved	1.00	ND	1.08	1.09	108	109	1	75-125			0	20
Cadmium,Dissolved	1.00	0.000301	1.12	1.14	112	114	1	75-125			1	20
Chromium,Dissolved	1.00	0.000769	1.05	1.06	104	106	1	75-125			1	20
Copper,Dissolved	1.00	ND	1.06	1.07	106	107	1	75-125			1	20
Nickel,Dissolved	1.00	0.00702	1.07	1.07	106	106	1	75-125			0	20
Selenium,Dissolved	1.00	0.00227	1.18	1.19	118	119	1	75-125			1	20
Silver,Dissolved	1.00	ND	1.07	1.08	107	108	1	75-125			1	20
Zinc,Dissolved	1.00	0.0168	1.03	1.04	101	102	1	75-125			1	20

Method Blank (MB)

(MB) 11/25/15 11:56

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Arsenic	U		0.65	2.00
Silver	U		0.28	1.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/25/15 11:59 • (LCSD) 11/25/15 12:02

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Arsenic	100	99.2	104	99	104	80-120			5	20
Silver	100	98.7	103	99	103	80-120			5	20

L800774-50 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/25/15 12:05 • (MS) 11/25/15 12:14 • (MSD) 11/25/15 12:17

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Arsenic	100	17.0	120	113	103	96	1	75-125			7	20
Silver	100	0.338	108	101	108	101	1	75-125			7	20

Method Blank (MB)

(MB) 11/19/15 23:25

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony,Dissolved	U		0.00021	0.00200
Arsenic,Dissolved	U		0.00025	0.00200
Lead,Dissolved	U		0.00024	0.00200
Thallium,Dissolved	U		0.00019	0.00200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/19/15 23:27 • (LCSD) 11/19/15 23:30

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	0.0538	0.0526	108	105	80-120			2	20
Arsenic,Dissolved	0.0500	0.0530	0.0543	106	109	80-120			3	20
Lead,Dissolved	0.0500	0.0487	0.0485	97	97	80-120			0	20
Thallium,Dissolved	0.0500	0.0488	0.0481	98	96	80-120			1	20

L800774-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/19/15 23:32 • (MS) 11/19/15 23:37 • (MSD) 11/19/15 23:39

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	0.000748	0.0582	0.0558	115	110	1	75-125			4	20
Arsenic,Dissolved	0.0500	0.00383	0.0603	0.0577	113	108	1	75-125			4	20
Lead,Dissolved	0.0500	0.000251	0.0489	0.0492	97	98	1	75-125			1	20
Thallium,Dissolved	0.0500	0.0000547	0.0499	0.0487	100	97	1	75-125			2	20

Method Blank (MB)

(MB) 11/16/15 17:29

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acetone	U		0.0100	0.0500
Acrylonitrile	U		0.00179	0.0100
Benzene	U		0.000270	0.00100
Bromobenzene	U		0.000284	0.00100
Bromodichloromethane	U		0.000254	0.00100
Bromoform	U		0.000424	0.00100
Bromomethane	U		0.00134	0.00500
n-Butylbenzene	U		0.000258	0.00100
sec-Butylbenzene	U		0.000201	0.00100
tert-Butylbenzene	U		0.000206	0.00100
Carbon tetrachloride	U		0.000328	0.00100
Chlorobenzene	U		0.000212	0.00100
Chlorodibromomethane	U		0.000373	0.00100
Chloroethane	U		0.000946	0.00500
2-Chloroethyl vinyl ether	U		0.00234	0.0500
Chloroform	U		0.000229	0.00500
Chloromethane	U		0.000375	0.00250
2-Chlorotoluene	U		0.000301	0.00100
4-Chlorotoluene	U		0.000240	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00105	0.00500
1,2-Dibromoethane	U		0.000343	0.00100
Dibromomethane	U		0.000382	0.00100
1,2-Dichlorobenzene	U		0.000305	0.00100
1,3-Dichlorobenzene	U		0.000239	0.00100
1,4-Dichlorobenzene	U		0.000226	0.00100
Dichlorodifluoromethane	U		0.000713	0.00500
1,1-Dichloroethane	U		0.000199	0.00100
1,2-Dichloroethane	U		0.000265	0.00100
1,1-Dichloroethene	U		0.000303	0.00100
cis-1,2-Dichloroethene	U		0.000235	0.00100
trans-1,2-Dichloroethene	U		0.000264	0.00100
1,2-Dichloropropane	U		0.000358	0.00100
1,1-Dichloropropene	U		0.000317	0.00100
1,3-Dichloropropane	U		0.000207	0.00100
cis-1,3-Dichloropropene	U		0.000262	0.00100
trans-1,3-Dichloropropene	U		0.000267	0.00100

Method Blank (MB)

(MB) 11/16/15 17:29

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
2,2-Dichloropropane	U		0.000279	0.00100
Di-isopropyl ether	U		0.000248	0.00100
Ethylbenzene	U		0.000297	0.00100
Hexachloro-1,3-butadiene	U		0.000342	0.00100
Isopropylbenzene	U		0.000243	0.00100
p-Isopropyltoluene	U		0.000204	0.00100
2-Butanone (MEK)	U		0.00468	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00188	0.0100
Methyl tert-butyl ether	U		0.000212	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000206	0.00100
Styrene	U		0.000234	0.00100
1,1,1,2-Tetrachloroethane	U		0.000264	0.00100
1,1,2,2-Tetrachloroethane	U		0.000365	0.00100
Tetrachloroethene	U		0.000276	0.00100
Toluene	U		0.000434	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000365	0.00100
1,2,3-Trichlorobenzene	U		0.000306	0.00100
1,2,4-Trichlorobenzene	U		0.000388	0.00100
1,1,1-Trichloroethane	U		0.000286	0.00100
1,1,2-Trichloroethane	U		0.000277	0.00100
Trichloroethene	U		0.000279	0.00100
Trichlorofluoromethane	U		0.000382	0.00500
1,2,3-Trichloropropane	U		0.000741	0.00250
1,2,3-Trimethylbenzene	U		0.000287	0.00100
1,2,4-Trimethylbenzene	U		0.000211	0.00100
1,3,5-Trimethylbenzene	U		0.000266	0.00100
Vinyl chloride	U		0.000291	0.00100
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	*104*			*88.7-115*
(S) Dibromofluoromethane	*96.2*			*76.3-123*
(S) 4-Bromofluorobenzene	*98.7*			*69.7-129*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/16/15 14:41 • (LCSD) 11/16/15 15:05

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.0940	0.0938	75.2	75.0	25.3-178			0.280	22.9
Acrylonitrile	0.125	0.105	0.112	84.3	89.2	57.8-143			5.61	20
Benzene	0.0250	0.0220	0.0209	88.0	83.5	72.6-120			5.23	20
Bromobenzene	0.0250	0.0223	0.0223	89.2	89.2	80.3-115			0.0200	20
Bromodichloromethane	0.0250	0.0210	0.0211	84.0	84.6	75.3-119			0.690	20
Bromoform	0.0250	0.0236	0.0252	94.5	101	69.1-135			6.31	20
Bromomethane	0.0250	0.0256	0.0225	102	89.9	23.0-191			12.9	20
n-Butylbenzene	0.0250	0.0233	0.0240	93.1	96.0	74.2-134			3.09	20
sec-Butylbenzene	0.0250	0.0234	0.0237	93.5	94.8	77.8-129			1.41	20
tert-Butylbenzene	0.0250	0.0240	0.0237	96.2	94.7	77.2-129			1.59	20
Carbon tetrachloride	0.0250	0.0213	0.0212	85.0	84.8	69.4-129			0.240	20
Chlorobenzene	0.0250	0.0231	0.0231	92.3	92.2	78.9-122			0.0600	20
Chlorodibromomethane	0.0250	0.0236	0.0236	94.3	94.5	76.4-126			0.240	20
Chloroethane	0.0250	0.0245	0.0239	98.1	95.4	47.2-147			2.75	20
2-Chloroethyl vinyl ether	0.125	0.103	0.105	82.4	83.9	16.7-162			1.79	23.7
Chloroform	0.0250	0.0217	0.0216	86.8	86.4	73.3-122			0.490	20
Chloromethane	0.0250	0.0139	0.0138	55.7	55.1	53.1-135			1.06	20
2-Chlorotoluene	0.0250	0.0219	0.0227	87.6	91.0	74.6-127			3.81	20
4-Chlorotoluene	0.0250	0.0226	0.0225	90.4	89.9	79.5-123			0.550	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0218	0.0251	87.0	101	64.9-131			14.4	20
1,2-Dibromoethane	0.0250	0.0228	0.0234	91.4	93.5	78.7-123			2.33	20
Dibromomethane	0.0250	0.0233	0.0239	93.4	95.5	78.5-117			2.30	20
1,2-Dichlorobenzene	0.0250	0.0229	0.0249	91.4	99.6	83.6-119			8.54	20
1,3-Dichlorobenzene	0.0250	0.0240	0.0235	95.8	94.0	75.9-129			1.91	20
1,4-Dichlorobenzene	0.0250	0.0222	0.0226	88.9	90.4	81.0-115			1.68	20
Dichlorodifluoromethane	0.0250	0.0191	0.0187	76.3	74.8	50.9-139			2.06	20
1,1-Dichloroethane	0.0250	0.0210	0.0204	83.8	81.4	71.7-125			2.90	20
1,2-Dichloroethane	0.0250	0.0198	0.0191	79.2	76.5	67.2-121			3.48	20
1,1-Dichloroethene	0.0250	0.0217	0.0226	86.8	90.5	60.6-133			4.12	20
cis-1,2-Dichloroethene	0.0250	0.0224	0.0220	89.7	87.9	76.1-121			2.11	20
trans-1,2-Dichloroethene	0.0250	0.0223	0.0222	89.3	88.8	70.7-124			0.460	20
1,2-Dichloropropane	0.0250	0.0218	0.0211	87.2	84.3	76.9-123			3.33	20
1,1-Dichloropropene	0.0250	0.0209	0.0211	83.6	84.4	71.2-126			0.950	20
1,3-Dichloropropane	0.0250	0.0219	0.0218	87.4	87.3	80.3-114			0.160	20
cis-1,3-Dichloropropene	0.0250	0.0232	0.0228	92.7	91.1	77.3-123			1.70	20
trans-1,3-Dichloropropene	0.0250	0.0227	0.0222	90.8	89.0	73.0-127			2.03	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/16/15 14:41 • (LCSD) 11/16/15 15:05

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
2,2-Dichloropropane	0.0250	0.0203	0.0205	81.3	82.0	61.9-132			0.790	20
Di-isopropyl ether	0.0250	0.0190	0.0204	76.2	81.6	67.2-131			6.88	20
Ethylbenzene	0.0250	0.0236	0.0228	94.4	91.0	78.6-124			3.68	20
Hexachloro-1,3-butadiene	0.0250	0.0222	0.0240	88.8	96.2	69.2-136			8.02	20
Isopropylbenzene	0.0250	0.0221	0.0223	88.5	89.4	79.4-126			0.910	20
p-Isopropyltoluene	0.0250	0.0237	0.0231	94.8	92.2	75.4-132			2.75	20
2-Butanone (MEK)	0.125	0.0957	0.0901	76.6	72.1	44.5-154			6.05	21.3
Methylene Chloride	0.0250	0.0225	0.0227	89.9	90.6	68.2-119			0.800	20
4-Methyl-2-pentanone (MIBK)	0.125	0.0966	0.101	77.3	81.2	61.1-138			4.91	20
Methyl tert-butyl ether	0.0250	0.0223	0.0212	89.0	84.8	70.2-122			4.81	20
Naphthalene	0.0250	0.0251	0.0285	100	114	69.9-132			12.6	20
n-Propylbenzene	0.0250	0.0238	0.0218	95.2	87.2	80.2-124			8.86	20
Styrene	0.0250	0.0240	0.0246	96.0	98.6	79.4-124			2.63	20
1,1,1,2-Tetrachloroethane	0.0250	0.0228	0.0227	91.3	90.7	76.7-127			0.600	20
1,1,2,2-Tetrachloroethane	0.0250	0.0243	0.0258	97.3	103	78.8-124			5.76	20
Tetrachloroethene	0.0250	0.0225	0.0223	90.0	89.3	71.1-133			0.800	20
Toluene	0.0250	0.0217	0.0218	86.9	87.3	76.7-116			0.510	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0218	0.0216	87.3	86.4	62.6-138			1.13	20
1,2,3-Trichlorobenzene	0.0250	0.0239	0.0279	95.8	112	72.5-137			15.4	20
1,2,4-Trichlorobenzene	0.0250	0.0242	0.0265	96.8	106	74.0-137			8.94	20
1,1,1-Trichloroethane	0.0250	0.0211	0.0211	84.3	84.3	69.9-127			0.0100	20
1,1,2-Trichloroethane	0.0250	0.0234	0.0233	93.5	93.3	81.9-119			0.140	20
Trichloroethene	0.0250	0.0218	0.0222	87.2	88.8	77.2-122			1.80	20
Trichlorofluoromethane	0.0250	0.0226	0.0234	90.6	93.6	51.5-151			3.28	20
1,2,3-Trichloropropane	0.0250	0.0230	0.0243	92.1	97.3	74.0-124			5.46	20
1,2,3-Trimethylbenzene	0.0250	0.0237	0.0240	94.9	95.8	79.4-118			0.940	20
1,2,4-Trimethylbenzene	0.0250	0.0250	0.0224	99.9	89.8	77.1-124			10.6	20
1,3,5-Trimethylbenzene	0.0250	0.0226	0.0217	90.4	87.0	79.0-125			3.84	20
Vinyl chloride	0.0250	0.0199	0.0198	79.6	79.3	58.4-134			0.300	20
Xylenes, Total	0.0750	0.0671	0.0663	89.4	88.4	78.1-123			1.12	20
(S) Toluene-d8				*102*	*104*	*88.7-115*				
(S) Dibromofluoromethane				*95.8*	*96.8*	*76.3-123*				
(S) 4-Bromofluorobenzene				*103*	*96.9*	*69.7-129*				

L800774-12 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/17/15 02:26 • (MS) 11/16/15 18:23 • (MSD) 11/16/15 18:47

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.00461	0.460	0.820	72.8	131	5	10.0-130		J3 J5	56.4	31.5
Acrylonitrile	0.125	ND	0.528	0.939	84.4	150	5	39.3-152		J3	56.1	27.2
Benzene	0.0250	ND	0.101	0.0885	81.0	70.8	5	47.8-131			13.4	22.8
Bromobenzene	0.0250	ND	0.104	0.0903	83.1	72.2	5	40.0-130			14.0	27.4
Bromodichloromethane	0.0250	ND	0.106	0.0977	84.9	78.1	5	50.6-128			8.26	22.8
Bromoform	0.0250	ND	0.114	0.123	90.8	98.5	5	43.3-139			8.11	25.9
Bromomethane	0.0250	ND	0.112	0.101	89.5	80.8	5	5.00-189			10.2	26.7
n-Butylbenzene	0.0250	ND	0.0859	0.0684	68.7	54.7	5	23.6-146			22.8	39.2
sec-Butylbenzene	0.0250	ND	0.101	0.0780	80.8	62.4	5	31.0-142			25.7	34.7
tert-Butylbenzene	0.0250	ND	0.111	0.0881	88.8	70.4	5	36.9-142			23.1	31.7
Carbon tetrachloride	0.0250	ND	0.0968	0.0826	77.4	66.1	5	46.0-140			15.8	27.2
Chlorobenzene	0.0250	ND	0.106	0.0992	85.0	79.4	5	44.1-134			6.82	25.7
Chlorodibromomethane	0.0250	ND	0.108	0.110	86.8	87.7	5	49.7-134			1.07	24
Chloroethane	0.0250	ND	0.118	0.110	94.2	88.1	5	5.00-164			6.64	28.4
2-Chloroethyl vinyl ether	0.125	ND	0.495	0.551	79.3	88.1	5	5.00-159			10.5	40
Chloroform	0.0250	ND	0.0994	0.0930	79.5	74.4	5	51.2-133			6.66	22.8
Chloromethane	0.0250	ND	0.0658	0.0636	52.7	50.8	5	31.4-141			3.49	24.6
2-Chlorotoluene	0.0250	ND	0.105	0.0842	83.8	67.3	5	36.1-137			21.8	28.9
4-Chlorotoluene	0.0250	ND	0.101	0.0837	80.8	66.9	5	35.4-137			18.8	29.8
1,2-Dibromo-3-Chloropropane	0.0250	ND	0.0943	0.167	75.5	134	5	40.4-138		J3	55.6	30.8
1,2-Dibromoethane	0.0250	ND	0.115	0.121	91.7	96.4	5	50.2-133			5.06	23.6
Dibromomethane	0.0250	ND	0.113	0.124	90.2	99.3	5	52.4-128			9.59	23
1,2-Dichlorobenzene	0.0250	ND	0.0980	0.0930	78.4	74.4	5	34.6-139			5.24	29.9
1,3-Dichlorobenzene	0.0250	ND	0.102	0.0871	81.2	69.7	5	28.4-142			15.3	31.2
1,4-Dichlorobenzene	0.0250	ND	0.0928	0.0828	74.3	66.3	5	35.0-133			11.4	31.1
Dichlorodifluoromethane	0.0250	ND	0.0803	0.0645	64.2	51.6	5	31.2-144			21.8	30.2
1,1-Dichloroethane	0.0250	ND	0.100	0.0906	80.0	72.5	5	49.1-136			9.87	22.9
1,2-Dichloroethane	0.0250	ND	0.0959	0.0981	76.7	78.5	5	47.1-129			2.33	22.7
1,1-Dichloroethene	0.0250	ND	0.102	0.0836	81.8	66.9	5	36.1-142			20.1	25.6
cis-1,2-Dichloroethene	0.0250	ND	0.106	0.0932	84.6	74.6	5	50.6-133			12.6	23
trans-1,2-Dichloroethene	0.0250	ND	0.0999	0.0856	79.9	68.5	5	43.8-135			15.4	24.8
1,2-Dichloropropane	0.0250	ND	0.104	0.0971	83.2	77.6	5	50.3-134			6.88	22.7
1,1-Dichloropropene	0.0250	ND	0.0914	0.0797	73.2	63.7	5	43.0-137			13.8	26.4
1,3-Dichloropropane	0.0250	ND	0.102	0.112	81.7	89.7	5	51.4-127			9.28	23.1
cis-1,3-Dichloropropene	0.0250	ND	0.108	0.100	86.5	80.2	5	48.4-134			7.49	23.6
trans-1,3-Dichloropropene	0.0250	ND	0.105	0.109	84.2	87.4	5	46.6-135			3.82	25.3

L800774-12 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/17/15 02:26 • (MS) 11/16/15 18:23 • (MSD) 11/16/15 18:47

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
2,2-Dichloropropane	0.0250	ND	0.0917	0.0808	73.3	64.7	5	45.2-141			12.6	26.6
Di-isopropyl ether	0.0250	ND	0.0969	0.0900	77.6	72.0	5	46.7-140			7.40	23.5
Ethylbenzene	0.0250	ND	0.106	0.0867	84.5	69.4	5	44.8-135			19.7	26.9
Hexachloro-1,3-butadiene	0.0250	ND	0.0798	0.0642	63.8	51.4	5	10.0-149			21.5	40
Isopropylbenzene	0.0250	ND	0.104	0.0859	83.2	68.7	5	41.9-139			19.1	29.3
p-Isopropyltoluene	0.0250	ND	0.101	0.0791	80.5	63.3	5	27.3-146			23.9	35.1
2-Butanone (MEK)	0.125	ND	0.460	0.863	73.5	138	5	23.9-170		J3	61.0	28.3
Methylene Chloride	0.0250	0.00227	0.110	0.104	86.5	81.1	5	46.7-125			6.32	22.2
4-Methyl-2-pentanone (MIBK)	0.125	ND	0.479	0.823	76.6	132	5	42.4-146		J3	53.0	26.7
Methyl tert-butyl ether	0.0250	ND	0.107	0.115	85.7	92.0	5	50.4-131			7.02	24.8
Naphthalene	0.0250	ND	0.0998	0.132	79.9	106	5	18.4-145			27.7	34
n-Propylbenzene	0.0250	ND	0.0955	0.0800	76.4	64.0	5	35.2-139			17.6	31.9
Styrene	0.0250	ND	0.111	0.0979	88.7	78.3	5	39.7-137			12.4	28.2
1,1,1,2-Tetrachloroethane	0.0250	ND	0.108	0.102	86.7	81.5	5	48.8-136			6.16	25.5
1,1,2,2-Tetrachloroethane	0.0250	ND	0.115	0.145	91.9	116	5	45.7-140			23.3	26.4
Tetrachloroethene	0.0250	ND	0.0943	0.0789	75.5	63.1	5	37.7-140			17.8	29.2
Toluene	0.0250	ND	0.103	0.0917	82.4	73.4	5	47.8-127			11.6	24.3
1,1,2-Trichlorotrifluoroethane	0.0250	ND	0.0890	0.0708	71.2	56.6	5	35.7-146			22.8	28.8
1,2,3-Trichlorobenzene	0.0250	ND	0.0969	0.0952	77.5	76.2	5	10.0-150			1.77	38.5
1,2,4-Trichlorobenzene	0.0250	ND	0.0898	0.0759	71.8	60.7	5	10.0-153			16.7	39.3
1,1,1-Trichloroethane	0.0250	ND	0.101	0.0832	80.7	66.5	5	49.0-138			19.3	25.3
1,1,2-Trichloroethane	0.0250	ND	0.114	0.116	91.1	92.5	5	52.3-132			1.44	23.4
Trichloroethene	0.0250	0.000522	0.105	0.0887	83.8	70.6	5	48.0-132			17.0	24.8
Trichlorofluoromethane	0.0250	ND	0.106	0.0853	84.7	68.2	5	12.8-169			21.5	29.7
1,2,3-Trichloropropane	0.0250	ND	0.117	0.152	93.2	122	5	44.4-138		J3	26.5	26.3
1,2,3-Trimethylbenzene	0.0250	ND	0.0982	0.0924	78.6	73.9	5	41.0-133			6.09	27.6
1,2,4-Trimethylbenzene	0.0250	ND	0.107	0.0923	85.8	73.9	5	32.9-139			15.0	30.6
1,3,5-Trimethylbenzene	0.0250	ND	0.104	0.0849	83.2	67.9	5	37.1-138			20.2	30.6
Vinyl chloride	0.0250	ND	0.0906	0.0772	72.5	61.8	5	32.0-146			15.9	26.3
Xylenes, Total	0.0750	ND	0.301	0.271	80.1	72.1	5	42.7-135			10.5	26.6
(S) Toluene-d8					*107*	*108*		*88.7-115*				
(S) Dibromofluoromethane					*93.4*	*95.0*		*76.3-123*				
(S) 4-Bromofluorobenzene					*101*	*97.6*		*69.7-129*				

Method Blank (MB)

(MB) 11/16/15 06:53

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acetone	U		0.0100	0.0500
Acrylonitrile	U		0.00179	0.0100
Benzene	U		0.000270	0.00100
Bromobenzene	U		0.000284	0.00100
Bromodichloromethane	U		0.000254	0.00100
Bromoform	U		0.000424	0.00100
Bromomethane	U		0.00134	0.00500
n-Butylbenzene	U		0.000258	0.00100
sec-Butylbenzene	U		0.000201	0.00100
tert-Butylbenzene	U		0.000206	0.00100
Carbon tetrachloride	U		0.000328	0.00100
Chlorobenzene	U		0.000212	0.00100
Chlorodibromomethane	U		0.000373	0.00100
Chloroethane	U		0.000946	0.00500
2-Chloroethyl vinyl ether	U		0.00234	0.0500
Chloroform	U		0.000229	0.00500
Chloromethane	U		0.000375	0.00250
2-Chlorotoluene	U		0.000301	0.00100
4-Chlorotoluene	U		0.000240	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00105	0.00500
1,2-Dibromoethane	U		0.000343	0.00100
Dibromomethane	U		0.000382	0.00100
1,2-Dichlorobenzene	U		0.000305	0.00100
1,3-Dichlorobenzene	U		0.000239	0.00100
1,4-Dichlorobenzene	U		0.000226	0.00100
Dichlorodifluoromethane	U		0.000713	0.00500
1,1-Dichloroethane	U		0.000199	0.00100
1,2-Dichloroethane	U		0.000265	0.00100
1,1-Dichloroethene	U		0.000303	0.00100
cis-1,2-Dichloroethene	U		0.000235	0.00100
trans-1,2-Dichloroethene	U		0.000264	0.00100
1,2-Dichloropropane	U		0.000358	0.00100
1,1-Dichloropropene	U		0.000317	0.00100
1,3-Dichloropropane	U		0.000207	0.00100
cis-1,3-Dichloropropene	U		0.000262	0.00100
trans-1,3-Dichloropropene	U		0.000267	0.00100

Method Blank (MB)

(MB) 11/16/15 06:53

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
2,2-Dichloropropane	U		0.000279	0.00100
Di-isopropyl ether	U		0.000248	0.00100
Ethylbenzene	U		0.000297	0.00100
Hexachloro-1,3-butadiene	U		0.000342	0.00100
Isopropylbenzene	U		0.000243	0.00100
p-Isopropyltoluene	U		0.000204	0.00100
2-Butanone (MEK)	U		0.00468	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00188	0.0100
Methyl tert-butyl ether	U		0.000212	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000206	0.00100
Styrene	U		0.000234	0.00100
1,1,1,2-Tetrachloroethane	U		0.000264	0.00100
1,1,2,2-Tetrachloroethane	U		0.000365	0.00100
Tetrachloroethene	U		0.000276	0.00100
Toluene	U		0.000434	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000365	0.00100
1,2,3-Trichlorobenzene	U		0.000306	0.00100
1,2,4-Trichlorobenzene	U		0.000388	0.00100
1,1,1-Trichloroethane	U		0.000286	0.00100
1,1,2-Trichloroethane	U		0.000277	0.00100
Trichloroethene	U		0.000279	0.00100
Trichlorofluoromethane	U		0.000382	0.00500
1,2,3-Trichloropropane	U		0.000741	0.00250
1,2,3-Trimethylbenzene	U		0.000287	0.00100
1,2,4-Trimethylbenzene	U		0.000211	0.00100
1,3,5-Trimethylbenzene	U		0.000266	0.00100
Vinyl chloride	U		0.000291	0.00100
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	*100*			*88.7-115*
(S) Dibromofluoromethane	*89.6*			*76.3-123*
(S) 4-Bromofluorobenzene	*103*			*69.7-129*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/16/15 04:57 • (LCSD) 11/16/15 05:17

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.110	0.103	87.9	82.3	25.3-178			6.57	22.9
Acrylonitrile	0.125	0.136	0.129	109	103	57.8-143			5.41	20
Benzene	0.0250	0.0221	0.0219	88.3	87.7	72.6-120			0.740	20
Bromobenzene	0.0250	0.0251	0.0251	100	100	80.3-115			0.0200	20
Bromodichloromethane	0.0250	0.0239	0.0240	95.6	95.8	75.3-119			0.200	20
Bromoform	0.0250	0.0266	0.0260	107	104	69.1-135			2.54	20
Bromomethane	0.0250	0.0336	0.0351	134	140	23.0-191			4.46	20
n-Butylbenzene	0.0250	0.0263	0.0264	105	106	74.2-134			0.330	20
sec-Butylbenzene	0.0250	0.0256	0.0262	103	105	77.8-129			2.15	20
tert-Butylbenzene	0.0250	0.0258	0.0260	103	104	77.2-129			0.680	20
Carbon tetrachloride	0.0250	0.0222	0.0219	88.9	87.7	69.4-129			1.38	20
Chlorobenzene	0.0250	0.0257	0.0254	103	102	78.9-122			0.870	20
Chlorodibromomethane	0.0250	0.0261	0.0263	104	105	76.4-126			0.530	20
Chloroethane	0.0250	0.0285	0.0276	114	110	47.2-147			3.29	20
2-Chloroethyl vinyl ether	0.125	0.129	0.128	104	102	16.7-162			1.34	23.7
Chloroform	0.0250	0.0229	0.0226	91.7	90.3	73.3-122			1.59	20
Chloromethane	0.0250	0.0173	0.0165	69.1	65.8	53.1-135			4.83	20
2-Chlorotoluene	0.0250	0.0252	0.0256	101	102	74.6-127			1.67	20
4-Chlorotoluene	0.0250	0.0255	0.0257	102	103	79.5-123			0.530	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0286	0.0260	114	104	64.9-131			9.54	20
1,2-Dibromoethane	0.0250	0.0259	0.0261	104	104	78.7-123			0.600	20
Dibromomethane	0.0250	0.0254	0.0253	102	101	78.5-117			0.220	20
1,2-Dichlorobenzene	0.0250	0.0244	0.0245	97.5	98.1	83.6-119			0.580	20
1,3-Dichlorobenzene	0.0250	0.0262	0.0264	105	106	75.9-129			0.850	20
1,4-Dichlorobenzene	0.0250	0.0249	0.0245	99.5	97.9	81.0-115			1.59	20
Dichlorodifluoromethane	0.0250	0.0227	0.0218	91.0	87.3	50.9-139			4.14	20
1,1-Dichloroethane	0.0250	0.0233	0.0228	93.0	91.2	71.7-125			1.95	20
1,2-Dichloroethane	0.0250	0.0228	0.0226	91.0	90.4	67.2-121			0.660	20
1,1-Dichloroethene	0.0250	0.0242	0.0235	96.9	94.0	60.6-133			2.95	20
cis-1,2-Dichloroethene	0.0250	0.0225	0.0218	90.0	87.3	76.1-121			3.04	20
trans-1,2-Dichloroethene	0.0250	0.0234	0.0233	93.5	93.2	70.7-124			0.320	20
1,2-Dichloropropane	0.0250	0.0246	0.0242	98.5	96.9	76.9-123			1.73	20
1,1-Dichloropropene	0.0250	0.0232	0.0229	92.8	91.8	71.2-126			1.13	20
1,3-Dichloropropane	0.0250	0.0253	0.0253	101	101	80.3-114			0.150	20
cis-1,3-Dichloropropene	0.0250	0.0248	0.0245	99.2	98.2	77.3-123			1.06	20
trans-1,3-Dichloropropene	0.0250	0.0252	0.0250	101	100	73.0-127			0.870	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/16/15 04:57 • (LCSD) 11/16/15 05:17

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
2,2-Dichloropropane	0.0250	0.0237	0.0233	94.8	93.3	61.9-132			1.66	20
Di-isopropyl ether	0.0250	0.0229	0.0227	91.6	90.9	67.2-131			0.820	20
Ethylbenzene	0.0250	0.0264	0.0264	106	105	78.6-124			0.300	20
Hexachloro-1,3-butadiene	0.0250	0.0263	0.0262	105	105	69.2-136			0.550	20
Isopropylbenzene	0.0250	0.0258	0.0258	103	103	79.4-126			0.240	20
p-Isopropyltoluene	0.0250	0.0262	0.0267	105	107	75.4-132			1.90	20
2-Butanone (MEK)	0.125	0.116	0.110	92.9	88.3	44.5-154			5.09	21.3
Methylene Chloride	0.0250	0.0206	0.0202	82.4	80.8	68.2-119			1.90	20
4-Methyl-2-pentanone (MIBK)	0.125	0.142	0.135	113	108	61.1-138			4.82	20
Methyl tert-butyl ether	0.0250	0.0223	0.0220	89.0	88.1	70.2-122			1.07	20
Naphthalene	0.0250	0.0253	0.0248	101	99.0	69.9-132			2.02	20
n-Propylbenzene	0.0250	0.0264	0.0265	106	106	80.2-124			0.190	20
Styrene	0.0250	0.0262	0.0262	105	105	79.4-124			0.0800	20
1,1,1,2-Tetrachloroethane	0.0250	0.0259	0.0265	104	106	76.7-127			2.20	20
1,1,2,2-Tetrachloroethane	0.0250	0.0272	0.0272	109	109	78.8-124			0.240	20
Tetrachloroethene	0.0250	0.0277	0.0280	111	112	71.1-133			1.27	20
Toluene	0.0250	0.0248	0.0242	99.1	96.9	76.7-116			2.23	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0236	0.0229	94.6	91.6	62.6-138			3.14	20
1,2,3-Trichlorobenzene	0.0250	0.0250	0.0251	99.9	100	72.5-137			0.380	20
1,2,4-Trichlorobenzene	0.0250	0.0261	0.0262	104	105	74.0-137			0.480	20
1,1,1-Trichloroethane	0.0250	0.0232	0.0235	92.8	93.8	69.9-127			1.10	20
1,1,2-Trichloroethane	0.0250	0.0250	0.0253	99.9	101	81.9-119			1.45	20
Trichloroethene	0.0250	0.0256	0.0252	102	101	77.2-122			1.56	20
Trichlorofluoromethane	0.0250	0.0250	0.0241	100	96.6	51.5-151			3.60	20
1,2,3-Trichloropropane	0.0250	0.0276	0.0269	110	108	74.0-124			2.33	20
1,2,3-Trimethylbenzene	0.0250	0.0246	0.0245	98.3	98.1	79.4-118			0.160	20
1,2,4-Trimethylbenzene	0.0250	0.0261	0.0263	105	105	77.1-124			0.610	20
1,3,5-Trimethylbenzene	0.0250	0.0257	0.0261	103	105	79.0-125			1.59	20
Vinyl chloride	0.0250	0.0237	0.0232	94.8	92.8	58.4-134			2.04	20
Xylenes, Total	0.0750	0.0770	0.0778	103	104	78.1-123			1.12	20
(S) Toluene-d8				*99.8*	*99.6*	*88.7-115*				
(S) Dibromofluoromethane				*89.0*	*87.8*	*76.3-123*				
(S) 4-Bromofluorobenzene				*98.5*	*101*	*69.7-129*				

L800774-48 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/16/15 08:44 • (MS) 11/16/15 07:46 • (MSD) 11/16/15 08:05

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.00378	0.428	0.372	67.8	58.9	5	10.0-130			13.9	31.5
Acrylonitrile	0.125	ND	0.521	0.482	83.3	77.1	5	39.3-152			7.80	27.2
Benzene	0.0250	ND	0.105	0.0915	83.7	73.2	5	47.8-131			13.4	22.8
Bromobenzene	0.0250	ND	0.118	0.0966	94.1	77.3	5	40.0-130			19.6	27.4
Bromodichloromethane	0.0250	ND	0.114	0.0981	91.3	78.5	5	50.6-128			15.1	22.8
Bromoform	0.0250	ND	0.118	0.102	94.4	81.6	5	43.3-139			14.5	25.9
Bromomethane	0.0250	ND	0.189	0.167	151	133	5	5.00-189			12.8	26.7
n-Butylbenzene	0.0250	0.000388	0.116	0.0852	92.3	67.8	5	23.6-146			30.5	39.2
sec-Butylbenzene	0.0250	ND	0.114	0.0846	91.3	67.7	5	31.0-142			29.8	34.7
tert-Butylbenzene	0.0250	ND	0.116	0.0868	92.8	69.4	5	36.9-142			28.8	31.7
Carbon tetrachloride	0.0250	ND	0.110	0.0878	87.9	70.3	5	46.0-140			22.3	27.2
Chlorobenzene	0.0250	ND	0.120	0.100	95.7	80.2	5	44.1-134			17.6	25.7
Chlorodibromomethane	0.0250	ND	0.121	0.106	97.1	85.2	5	49.7-134			13.1	24
Chloroethane	0.0250	ND	0.135	0.121	108	97.1	5	5.00-164			10.4	28.4
2-Chloroethyl vinyl ether	0.125	ND	0.544	0.485	87.0	77.6	5	5.00-159			11.4	40
Chloroform	0.0250	ND	0.109	0.0976	87.2	78.0	5	51.2-133			11.1	22.8
Chloromethane	0.0250	ND	0.0801	0.0706	64.1	56.4	5	31.4-141			12.7	24.6
2-Chlorotoluene	0.0250	ND	0.113	0.0937	90.6	74.9	5	36.1-137			19.0	28.9
4-Chlorotoluene	0.0250	ND	0.117	0.0931	93.8	74.5	5	35.4-137			23.0	29.8
1,2-Dibromo-3-Chloropropane	0.0250	ND	0.105	0.0897	84.3	71.7	5	40.4-138			16.0	30.8
1,2-Dibromoethane	0.0250	ND	0.118	0.102	94.5	81.6	5	50.2-133			14.7	23.6
Dibromomethane	0.0250	ND	0.117	0.102	93.9	81.4	5	52.4-128			14.4	23
1,2-Dichlorobenzene	0.0250	ND	0.116	0.0922	92.9	73.8	5	34.6-139			23.0	29.9
1,3-Dichlorobenzene	0.0250	ND	0.120	0.0959	95.8	76.7	5	28.4-142			22.2	31.2
1,4-Dichlorobenzene	0.0250	ND	0.115	0.0913	92.1	73.0	5	35.0-133			23.1	31.1
Dichlorodifluoromethane	0.0250	ND	0.105	0.0875	83.7	70.0	5	31.2-144			17.8	30.2
1,1-Dichloroethane	0.0250	ND	0.109	0.0979	87.0	78.3	5	49.1-136			10.5	22.9
1,2-Dichloroethane	0.0250	ND	0.107	0.0969	85.8	77.5	5	47.1-129			10.2	22.7
1,1-Dichloroethene	0.0250	ND	0.113	0.100	90.2	80.3	5	36.1-142			11.7	25.6
cis-1,2-Dichloroethene	0.0250	ND	0.105	0.0970	84.0	77.6	5	50.6-133			7.90	23
trans-1,2-Dichloroethene	0.0250	ND	0.110	0.0999	87.9	79.9	5	43.8-135			9.50	24.8
1,2-Dichloropropane	0.0250	ND	0.115	0.101	92.2	80.9	5	50.3-134			13.1	22.7
1,1-Dichloropropene	0.0250	ND	0.108	0.0915	86.2	73.2	5	43.0-137			16.3	26.4
1,3-Dichloropropane	0.0250	ND	0.116	0.104	92.4	82.9	5	51.4-127			10.9	23.1
cis-1,3-Dichloropropene	0.0250	ND	0.117	0.103	93.9	82.5	5	48.4-134			13.0	23.6
trans-1,3-Dichloropropene	0.0250	ND	0.116	0.101	92.9	81.2	5	46.6-135			13.5	25.3

L800774-48 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/16/15 08:44 • (MS) 11/16/15 07:46 • (MSD) 11/16/15 08:05

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
2,2-Dichloropropane	0.0250	ND	0.110	0.0965	87.8	77.2	5	45.2-141			12.9	26.6
Di-isopropyl ether	0.0250	ND	0.109	0.0945	87.1	75.6	5	46.7-140			14.2	23.5
Ethylbenzene	0.0250	ND	0.120	0.0982	96.3	78.6	5	44.8-135			20.3	26.9
Hexachloro-1,3-butadiene	0.0250	ND	0.109	0.0784	86.9	62.7	5	10.0-149			32.3	40
Isopropylbenzene	0.0250	ND	0.116	0.0907	93.1	72.6	5	41.9-139			24.7	29.3
p-Isopropyltoluene	0.0250	ND	0.116	0.0861	92.8	68.9	5	27.3-146			29.7	35.1
2-Butanone (MEK)	0.125	ND	0.447	0.397	71.6	63.5	5	23.9-170			11.9	28.3
Methylene Chloride	0.0250	0.00158	0.0945	0.0868	74.3	68.1	5	46.7-125			8.56	22.2
4-Methyl-2-pentanone (MIBK)	0.125	ND	0.574	0.494	91.8	79.1	5	42.4-146			14.9	26.7
Methyl tert-butyl ether	0.0250	ND	0.104	0.0918	83.4	73.4	5	50.4-131			12.7	24.8
Naphthalene	0.0250	0.000772	0.108	0.0887	86.1	70.4	5	18.4-145			20.0	34
n-Propylbenzene	0.0250	ND	0.119	0.0906	95.5	72.5	5	35.2-139			27.4	31.9
Styrene	0.0250	ND	0.122	0.102	97.9	81.5	5	39.7-137			18.3	28.2
1,1,1,2-Tetrachloroethane	0.0250	ND	0.122	0.104	97.6	83.0	5	48.8-136			16.2	25.5
1,1,2,2-Tetrachloroethane	0.0250	ND	0.120	0.102	96.2	82.0	5	45.7-140			15.9	26.4
Tetrachloroethene	0.0250	ND	0.125	0.101	100	80.9	5	37.7-140			21.1	29.2
Toluene	0.0250	ND	0.114	0.0968	91.3	77.4	5	47.8-127			16.4	24.3
1,1,2-Trichlorotrifluoroethane	0.0250	ND	0.107	0.0834	85.9	66.7	5	35.7-146			25.2	28.8
1,2,3-Trichlorobenzene	0.0250	ND	0.113	0.0861	90.7	68.9	5	10.0-150			27.4	38.5
1,2,4-Trichlorobenzene	0.0250	ND	0.118	0.0891	94.3	71.2	5	10.0-153			27.8	39.3
1,1,1-Trichloroethane	0.0250	ND	0.110	0.0931	87.9	74.5	5	49.0-138			16.6	25.3
1,1,2-Trichloroethane	0.0250	ND	0.115	0.102	92.2	81.7	5	52.3-132			12.0	23.4
Trichloroethene	0.0250	ND	0.118	0.102	94.2	81.4	5	48.0-132			14.6	24.8
Trichlorofluoromethane	0.0250	ND	0.117	0.0989	93.5	79.1	5	12.8-169			16.6	29.7
1,2,3-Trichloropropane	0.0250	ND	0.117	0.0997	93.3	79.7	5	44.4-138			15.7	26.3
1,2,3-Trimethylbenzene	0.0250	ND	0.114	0.0903	91.5	72.3	5	41.0-133			23.5	27.6
1,2,4-Trimethylbenzene	0.0250	ND	0.119	0.0911	95.4	72.9	5	32.9-139			26.7	30.6
1,3,5-Trimethylbenzene	0.0250	ND	0.116	0.0886	93.1	70.9	5	37.1-138			27.1	30.6
Vinyl chloride	0.0250	ND	0.112	0.101	90.0	80.8	5	32.0-146			10.7	26.3
Xylenes, Total	0.0750	0.000357	0.355	0.284	94.5	75.6	5	42.7-135			22.1	26.6
(S) Toluene-d8					*100*	*99.5*		*88.7-115*				
(S) Dibromofluoromethane					*90.9*	*91.3*		*76.3-123*				
(S) 4-Bromofluorobenzene					*99.3*	*99.8*		*69.7-129*				

Method Blank (MB)

(MB) 11/16/15 06:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrolein	U		0.00887	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromobenzene	U		0.000352	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
n-Butylbenzene	U		0.000361	0.00100
sec-Butylbenzene	U		0.000365	0.00100
tert-Butylbenzene	U		0.000399	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
2-Chloroethyl vinyl ether	U		0.00301	0.0500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
2-Chlorotoluene	U		0.000375	0.00100
4-Chlorotoluene	U		0.000351	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,3-Dichlorobenzene	U		0.000220	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
Dichlorodifluoromethane	U		0.000551	0.00500
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
1,1-Dichloropropene	U		0.000352	0.00100
1,3-Dichloropropane	U		0.000366	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100

Method Blank (MB)

(MB) 11/16/15 06:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
trans-1,3-Dichloropropene	U		0.000419	0.00100
2,2-Dichloropropane	U		0.000321	0.00100
Di-isopropyl ether	U		0.000320	0.00100
Ethylbenzene	U		0.000384	0.00100
Hexachloro-1,3-butadiene	U		0.000256	0.00100
Isopropylbenzene	U		0.000326	0.00100
p-Isopropyltoluene	U		0.000350	0.00100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Methyl tert-butyl ether	U		0.000367	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000349	0.00100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000780	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100
1,2,3-Trichlorobenzene	U		0.000230	0.00100
1,2,4-Trichlorobenzene	U		0.000355	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
1,2,3-Trimethylbenzene	U		0.000321	0.00100
1,2,4-Trimethylbenzene	U		0.000373	0.00100
1,3,5-Trimethylbenzene	U		0.000387	0.00100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*107*			*90.0-115*
(S) Dibromofluoromethane	*96.8*			*79.0-121*
(S) 4-Bromofluorobenzene	*101*			*80.1-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/16/15 04:21 • (LCSD) 11/16/15 04:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.140	0.130	112	104	28.7-175			7.18	20.9
Acrolein	0.125	0.104	0.0975	83.0	78.0	40.4-172			6.21	20
Acrylonitrile	0.125	0.0974	0.0917	77.9	73.3	58.2-145			6.10	20
Benzene	0.0250	0.0220	0.0218	88.1	87.4	73.0-122			0.860	20
Bromobenzene	0.0250	0.0258	0.0250	103	100	81.5-115			3.25	20
Bromodichloromethane	0.0250	0.0278	0.0262	111	105	75.5-121			5.91	20
Bromoform	0.0250	0.0243	0.0241	97.4	96.4	71.5-131			0.970	20
Bromomethane	0.0250	0.0255	0.0257	102	103	22.4-187			0.660	20
n-Butylbenzene	0.0250	0.0284	0.0287	114	115	75.9-134			1.10	20
sec-Butylbenzene	0.0250	0.0263	0.0264	105	106	80.6-126			0.330	20
tert-Butylbenzene	0.0250	0.0264	0.0264	106	106	79.3-127			0.0400	20
Carbon tetrachloride	0.0250	0.0279	0.0275	112	110	70.9-129			1.36	20
Chlorobenzene	0.0250	0.0240	0.0243	95.8	97.1	79.7-122			1.28	20
Chlorodibromomethane	0.0250	0.0252	0.0251	101	100	78.2-124			0.430	20
Chloroethane	0.0250	0.0269	0.0264	107	106	41.2-153			1.80	20
2-Chloroethyl vinyl ether	0.125	0.130	0.123	104	98.4	23.4-162			5.53	23.5
Chloroform	0.0250	0.0257	0.0252	103	101	73.2-125			1.98	20
Chloromethane	0.0250	0.0222	0.0225	88.9	89.9	55.8-134			1.17	20
2-Chlorotoluene	0.0250	0.0241	0.0242	96.2	96.9	76.4-125			0.680	20
4-Chlorotoluene	0.0250	0.0262	0.0258	105	103	81.5-121			1.31	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0240	0.0211	96.0	84.3	64.8-131			13.1	20
1,2-Dibromoethane	0.0250	0.0224	0.0216	89.6	86.5	79.8-122			3.60	20
Dibromomethane	0.0250	0.0242	0.0240	96.9	96.2	79.5-118			0.810	20
1,2-Dichlorobenzene	0.0250	0.0246	0.0244	98.6	97.5	84.7-118			1.11	20
1,3-Dichlorobenzene	0.0250	0.0254	0.0265	101	106	77.6-127			4.37	20
1,4-Dichlorobenzene	0.0250	0.0246	0.0239	98.5	95.8	82.2-114			2.82	20
Dichlorodifluoromethane	0.0250	0.0273	0.0271	109	108	56.0-134			0.800	20
1,1-Dichloroethane	0.0250	0.0236	0.0236	94.3	94.5	71.7-127			0.200	20
1,2-Dichloroethane	0.0250	0.0277	0.0268	111	107	65.3-126			3.36	20
1,1-Dichloroethene	0.0250	0.0296	0.0294	118	118	59.9-137			0.610	20
cis-1,2-Dichloroethene	0.0250	0.0223	0.0232	89.3	92.6	77.3-122			3.69	20
trans-1,2-Dichloroethene	0.0250	0.0230	0.0231	92.2	92.4	72.6-125			0.180	20
1,2-Dichloropropane	0.0250	0.0236	0.0219	94.6	87.5	77.4-125			7.79	20
1,1-Dichloropropene	0.0250	0.0256	0.0245	103	98.1	72.5-127			4.39	20
1,3-Dichloropropane	0.0250	0.0214	0.0214	85.5	85.5	80.6-115			0.0300	20
cis-1,3-Dichloropropene	0.0250	0.0249	0.0247	99.5	98.9	77.7-124			0.550	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/16/15 04:21 • (LCSD) 11/16/15 04:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
trans-1,3-Dichloropropene	0.0250	0.0272	0.0252	109	101	73.5-127			7.78	20
2,2-Dichloropropane	0.0250	0.0305	0.0302	122	121	61.3-134			1.14	20
Di-isopropyl ether	0.0250	0.0222	0.0222	88.8	88.9	65.1-135			0.130	20
Ethylbenzene	0.0250	0.0242	0.0257	96.9	103	80.9-121			5.91	20
Hexachloro-1,3-butadiene	0.0250	0.0272	0.0271	109	108	73.7-133			0.650	20
Isopropylbenzene	0.0250	0.0253	0.0260	101	104	81.6-124			2.94	20
p-Isopropyltoluene	0.0250	0.0268	0.0276	107	110	77.6-129			2.82	20
2-Butanone (MEK)	0.125	0.104	0.0945	82.9	75.6	46.4-155			9.19	20
Methylene Chloride	0.0250	0.0224	0.0224	89.5	89.6	69.5-120			0.150	20
4-Methyl-2-pentanone (MIBK)	0.125	0.103	0.0918	82.2	73.4	63.3-138			11.3	20
Methyl tert-butyl ether	0.0250	0.0198	0.0204	79.3	81.4	70.1-125			2.73	20
Naphthalene	0.0250	0.0245	0.0244	98.1	97.7	69.7-134			0.420	20
n-Propylbenzene	0.0250	0.0268	0.0264	107	105	81.9-122			1.71	20
Styrene	0.0250	0.0250	0.0243	99.9	97.2	79.9-124			2.69	20
1,1,1,2-Tetrachloroethane	0.0250	0.0256	0.0256	102	102	78.5-125			0.220	20
1,1,2,2-Tetrachloroethane	0.0250	0.0221	0.0218	88.5	87.0	79.3-123			1.67	20
Tetrachloroethene	0.0250	0.0250	0.0251	100	101	73.5-130			0.380	20
Toluene	0.0250	0.0232	0.0229	92.6	91.4	77.9-116			1.27	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0269	0.0275	107	110	62.0-141			2.36	20
1,2,3-Trichlorobenzene	0.0250	0.0273	0.0265	109	106	75.7-134			2.63	20
1,2,4-Trichlorobenzene	0.0250	0.0272	0.0273	109	109	76.1-136			0.340	20
1,1,1-Trichloroethane	0.0250	0.0283	0.0281	113	113	71.1-129			0.480	20
1,1,2-Trichloroethane	0.0250	0.0232	0.0226	92.9	90.3	81.6-120			2.84	20
Trichloroethene	0.0250	0.0249	0.0240	99.5	95.8	79.5-121			3.71	20
Trichlorofluoromethane	0.0250	0.0291	0.0302	116	121	49.1-157			3.77	20
1,2,3-Trichloropropane	0.0250	0.0243	0.0224	97.0	89.7	74.9-124			7.88	20
1,2,3-Trimethylbenzene	0.0250	0.0251	0.0252	100	101	79.9-118			0.500	20
1,2,4-Trimethylbenzene	0.0250	0.0264	0.0259	106	104	79.0-122			2.10	20
1,3,5-Trimethylbenzene	0.0250	0.0262	0.0261	105	105	81.0-123			0.320	20
Vinyl chloride	0.0250	0.0270	0.0283	108	113	61.5-134			4.64	20
Xylenes, Total	0.0750	0.0712	0.0730	94.9	97.3	79.2-122			2.57	20
(S) Toluene-d8				*106*	*103*	*90.0-115*				
(S) Dibromofluoromethane				*101*	*101*	*79.0-121*				
(S) 4-Bromofluorobenzene				*104*	*102*	*80.1-120*				

L800773-34 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/16/15 08:18 • (MS) 11/16/15 07:22 • (MSD) 11/16/15 07:41

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.000887	0.0593	0.0587	46.7	46.3	1	25.0-156			0.980	21.5
Acrolein	0.125	ND	0.147	0.139	118	111	1	34.0-194			5.36	21.5
Acrylonitrile	0.125	ND	0.0890	0.0883	71.2	70.7	1	55.9-161			0.760	20
Benzene	0.0250	ND	0.0223	0.0223	89.1	89.4	1	58.6-133			0.240	20
Bromobenzene	0.0250	ND	0.0259	0.0258	104	103	1	70.6-125			0.310	20
Bromodichloromethane	0.0250	0.000459	0.0282	0.0276	111	109	1	69.2-127			2.27	20
Bromoform	0.0250	ND	0.0244	0.0239	97.5	95.8	1	66.3-140			1.82	20
Bromomethane	0.0250	ND	0.0249	0.0260	99.5	104	1	16.6-183			4.47	20.5
n-Butylbenzene	0.0250	ND	0.0280	0.0281	112	112	1	64.8-145			0.420	20
sec-Butylbenzene	0.0250	ND	0.0273	0.0266	109	106	1	66.8-139			2.79	20
tert-Butylbenzene	0.0250	ND	0.0267	0.0266	107	106	1	67.1-138			0.350	20
Carbon tetrachloride	0.0250	ND	0.0289	0.0279	115	112	1	60.6-139			3.32	20
Chlorobenzene	0.0250	ND	0.0245	0.0239	98.2	95.8	1	70.1-130			2.48	20
Chlorodibromomethane	0.0250	ND	0.0256	0.0259	102	104	1	71.6-132			1.42	20
Chloroethane	0.0250	ND	0.0271	0.0262	108	105	1	33.3-155			3.23	20
2-Chloroethyl vinyl ether	0.125	ND	0.0521	0.0159	41.7	12.8	1	5.00-149		J3	106	40
Chloroform	0.0250	0.00106	0.0271	0.0269	104	103	1	66.1-133			0.870	20
Chloromethane	0.0250	ND	0.0217	0.0221	86.6	88.5	1	40.7-139			2.09	20
2-Chlorotoluene	0.0250	ND	0.0246	0.0256	98.5	102	1	66.9-134			3.81	20
4-Chlorotoluene	0.0250	ND	0.0264	0.0268	106	107	1	66.8-134			1.29	20
1,2-Dibromo-3-Chloropropane	0.0250	ND	0.0196	0.0212	78.2	84.7	1	63.9-142			7.90	20.2
1,2-Dibromoethane	0.0250	ND	0.0227	0.0222	90.9	88.8	1	73.8-131			2.32	20
Dibromomethane	0.0250	ND	0.0256	0.0240	103	96.0	1	72.8-127			6.59	20
1,2-Dichlorobenzene	0.0250	ND	0.0246	0.0252	98.6	101	1	77.4-127			2.24	20
1,3-Dichlorobenzene	0.0250	ND	0.0266	0.0273	106	109	1	67.9-136			2.67	20
1,4-Dichlorobenzene	0.0250	ND	0.0243	0.0253	97.1	101	1	74.4-123			4.15	20
Dichlorodifluoromethane	0.0250	ND	0.0273	0.0262	109	105	1	42.2-146			4.02	20
1,1-Dichloroethane	0.0250	ND	0.0247	0.0248	98.9	99.3	1	64.0-134			0.350	20
1,2-Dichloroethane	0.0250	ND	0.0282	0.0280	113	112	1	60.7-132			0.850	20
1,1-Dichloroethene	0.0250	0.000409	0.0307	0.0302	121	119	1	48.8-144			1.80	20
cis-1,2-Dichloroethene	0.0250	ND	0.0234	0.0235	93.7	94.1	1	60.6-136			0.520	20
trans-1,2-Dichloroethene	0.0250	ND	0.0242	0.0241	96.9	96.3	1	61.0-132			0.690	20
1,2-Dichloropropane	0.0250	ND	0.0245	0.0235	98.0	94.0	1	69.7-130			4.16	20
1,1-Dichloropropene	0.0250	ND	0.0249	0.0254	99.5	102	1	61.5-136			2.12	20
1,3-Dichloropropane	0.0250	ND	0.0218	0.0230	87.3	91.8	1	74.3-123			5.01	20
cis-1,3-Dichloropropene	0.0250	ND	0.0256	0.0242	102	96.7	1	71.1-129			5.49	20

L800773-34 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/16/15 08:18 • (MS) 11/16/15 07:22 • (MSD) 11/16/15 07:41

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
trans-1,3-Dichloropropene	0.0250	ND	0.0277	0.0257	111	103	1	66.3-136			7.67	20
2,2-Dichloropropane	0.0250	ND	0.0312	0.0306	125	123	1	54.9-142			1.84	20
Di-isopropyl ether	0.0250	ND	0.0227	0.0232	91.0	92.7	1	59.9-140			1.88	20
Ethylbenzene	0.0250	ND	0.0248	0.0249	99.3	99.7	1	62.7-136			0.380	20
Hexachloro-1,3-butadiene	0.0250	ND	0.0277	0.0290	111	116	1	61.1-144			4.81	20.1
Isopropylbenzene	0.0250	ND	0.0257	0.0259	103	103	1	67.4-136			0.480	20
p-Isopropyltoluene	0.0250	ND	0.0279	0.0283	111	113	1	62.8-143			1.58	20
2-Butanone (MEK)	0.125	ND	0.0674	0.0663	53.9	53.0	1	45.0-156			1.63	20.8
Methylene Chloride	0.0250	ND	0.0222	0.0223	88.8	89.2	1	61.5-125			0.380	20
4-Methyl-2-pentanone (MIBK)	0.125	ND	0.0937	0.0917	74.9	73.4	1	60.7-150			2.06	20
Methyl tert-butyl ether	0.0250	ND	0.0213	0.0212	85.1	84.8	1	61.4-136			0.420	20
Naphthalene	0.0250	ND	0.0234	0.0252	93.7	101	1	61.8-143			7.45	20
n-Propylbenzene	0.0250	ND	0.0270	0.0270	108	108	1	63.2-139			0.170	20
Styrene	0.0250	ND	0.0249	0.0241	99.5	96.3	1	68.2-133			3.23	20
1,1,1,2-Tetrachloroethane	0.0250	ND	0.0260	0.0269	104	108	1	70.5-132			3.37	20
1,1,2,2-Tetrachloroethane	0.0250	ND	0.0218	0.0208	87.0	83.3	1	64.9-145			4.36	20
Tetrachloroethene	0.0250	ND	0.0256	0.0260	103	104	1	57.4-141			1.58	20
Toluene	0.0250	ND	0.0252	0.0230	101	92.0	1	67.8-124			9.11	20
1,1,2-Trichlorotrifluoroethane	0.0250	ND	0.0270	0.0276	108	111	1	53.7-150			2.25	20
1,2,3-Trichlorobenzene	0.0250	ND	0.0276	0.0286	111	114	1	65.7-143			3.23	20
1,2,4-Trichlorobenzene	0.0250	ND	0.0272	0.0287	109	115	1	67.0-146			5.24	20
1,1,1-Trichloroethane	0.0250	ND	0.0288	0.0282	115	113	1	58.7-134			2.27	20
1,1,2-Trichloroethane	0.0250	ND	0.0227	0.0234	91.0	93.7	1	74.1-130			2.89	20
Trichloroethene	0.0250	0.0136	0.0336	0.0322	80.0	74.4	1	48.9-148			4.25	20
Trichlorofluoromethane	0.0250	ND	0.0299	0.0290	119	116	1	39.9-165			2.82	20
1,2,3-Trichloropropane	0.0250	ND	0.0230	0.0231	91.9	92.5	1	71.5-134			0.740	20
1,2,3-Trimethylbenzene	0.0250	ND	0.0257	0.0258	103	103	1	62.7-133			0.470	20
1,2,4-Trimethylbenzene	0.0250	ND	0.0258	0.0272	103	109	1	60.5-137			5.24	20
1,3,5-Trimethylbenzene	0.0250	ND	0.0266	0.0276	106	110	1	67.9-134			3.61	20
Vinyl chloride	0.0250	ND	0.0262	0.0257	105	103	1	44.3-143			2.08	20
Xylenes, Total	0.0750	ND	0.0743	0.0745	99.0	99.4	1	65.6-133			0.360	20
(S) Toluene-d8					*105*	*101*		*90.0-115*				
(S) Dibromofluoromethane					*106*	*101*		*79.0-121*				
(S) 4-Bromofluorobenzene					*105*	*101*		*80.1-120*				

Method Blank (MB)

(MB) 11/15/15 03:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrolein	U		0.00887	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromobenzene	U		0.000352	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
n-Butylbenzene	U		0.000361	0.00100
sec-Butylbenzene	U		0.000365	0.00100
tert-Butylbenzene	U		0.000399	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
2-Chloroethyl vinyl ether	U		0.00301	0.0500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
2-Chlorotoluene	U		0.000375	0.00100
4-Chlorotoluene	U		0.000351	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,3-Dichlorobenzene	U		0.000220	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
Dichlorodifluoromethane	U		0.000551	0.00500
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
1,1-Dichloropropene	U		0.000352	0.00100
1,3-Dichloropropane	U		0.000366	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100

Method Blank (MB)

(MB) 11/15/15 03:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
trans-1,3-Dichloropropene	U		0.000419	0.00100
2,2-Dichloropropane	U		0.000321	0.00100
Di-isopropyl ether	U		0.000320	0.00100
Ethylbenzene	U		0.000384	0.00100
Hexachloro-1,3-butadiene	U		0.000256	0.00100
Isopropylbenzene	U		0.000326	0.00100
p-Isopropyltoluene	U		0.000350	0.00100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Methyl tert-butyl ether	U		0.000367	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000349	0.00100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000780	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100
1,2,3-Trichlorobenzene	U		0.000230	0.00100
1,2,4-Trichlorobenzene	U		0.000355	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
1,2,3-Trimethylbenzene	U		0.000321	0.00100
1,2,4-Trimethylbenzene	U		0.000373	0.00100
1,3,5-Trimethylbenzene	U		0.000387	0.00100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*97.3*			*90.0-115*
(S) Dibromofluoromethane	*94.3*			*79.0-121*
(S) 4-Bromofluorobenzene	*98.3*			*80.1-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/15/15 01:32 • (LCSD) 11/15/15 01:52

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.143	0.139	115	111	28.7-175			2.89	20.9
Acrolein	0.125	0.162	0.148	129	119	40.4-172			8.61	20
Acrylonitrile	0.125	0.127	0.121	102	97.0	58.2-145			4.67	20
Benzene	0.0250	0.0240	0.0228	95.9	91.4	73.0-122			4.79	20
Bromobenzene	0.0250	0.0255	0.0234	102	93.8	81.5-115			8.20	20
Bromodichloromethane	0.0250	0.0263	0.0247	105	98.8	75.5-121			6.10	20
Bromoform	0.0250	0.0285	0.0266	114	106	71.5-131			6.75	20
Bromomethane	0.0250	0.0284	0.0268	113	107	22.4-187			5.51	20
n-Butylbenzene	0.0250	0.0264	0.0245	106	97.9	75.9-134			7.69	20
sec-Butylbenzene	0.0250	0.0273	0.0254	109	102	80.6-126			7.27	20
tert-Butylbenzene	0.0250	0.0268	0.0246	107	98.6	79.3-127			8.35	20
Carbon tetrachloride	0.0250	0.0262	0.0252	105	101	70.9-129			3.99	20
Chlorobenzene	0.0250	0.0276	0.0252	110	101	79.7-122			9.03	20
Chlorodibromomethane	0.0250	0.0274	0.0253	110	101	78.2-124			8.09	20
Chloroethane	0.0250	0.0305	0.0295	122	118	41.2-153			3.57	20
2-Chloroethyl vinyl ether	0.125	0.147	0.139	117	111	23.4-162			5.44	23.5
Chloroform	0.0250	0.0242	0.0229	97.0	91.5	73.2-125			5.74	20
Chloromethane	0.0250	0.0238	0.0229	95.1	91.7	55.8-134			3.58	20
2-Chlorotoluene	0.0250	0.0269	0.0242	107	96.8	76.4-125			10.5	20
4-Chlorotoluene	0.0250	0.0264	0.0243	106	97.1	81.5-121			8.35	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0271	0.0256	108	102	64.8-131			5.90	20
1,2-Dibromoethane	0.0250	0.0281	0.0259	113	104	79.8-122			8.21	20
Dibromomethane	0.0250	0.0268	0.0255	107	102	79.5-118			4.95	20
1,2-Dichlorobenzene	0.0250	0.0263	0.0243	105	97.2	84.7-118			8.07	20
1,3-Dichlorobenzene	0.0250	0.0277	0.0253	111	101	77.6-127			9.13	20
1,4-Dichlorobenzene	0.0250	0.0269	0.0248	107	99.3	82.2-114			7.87	20
Dichlorodifluoromethane	0.0250	0.0276	0.0274	111	110	56.0-134			0.930	20
1,1-Dichloroethane	0.0250	0.0242	0.0230	96.8	91.9	71.7-127			5.19	20
1,2-Dichloroethane	0.0250	0.0268	0.0254	107	102	65.3-126			5.46	20
1,1-Dichloroethene	0.0250	0.0260	0.0249	104	99.8	59.9-137			4.13	20
cis-1,2-Dichloroethene	0.0250	0.0253	0.0236	101	94.3	77.3-122			6.86	20
trans-1,2-Dichloroethene	0.0250	0.0250	0.0239	100	95.7	72.6-125			4.59	20
1,2-Dichloropropane	0.0250	0.0255	0.0240	102	96.1	77.4-125			6.03	20
1,1-Dichloropropene	0.0250	0.0251	0.0241	100	96.3	72.5-127			4.06	20
1,3-Dichloropropane	0.0250	0.0270	0.0246	108	98.3	80.6-115			9.44	20
cis-1,3-Dichloropropene	0.0250	0.0263	0.0248	105	99.4	77.7-124			5.63	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/15/15 01:32 • (LCSD) 11/15/15 01:52

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
trans-1,3-Dichloropropene	0.0250	0.0270	0.0255	108	102	73.5-127			5.68	20
2,2-Dichloropropane	0.0250	0.0242	0.0235	96.8	94.0	61.3-134			2.97	20
Di-isopropyl ether	0.0250	0.0230	0.0220	92.1	87.8	65.1-135			4.79	20
Ethylbenzene	0.0250	0.0268	0.0247	107	99.0	80.9-121			7.84	20
Hexachloro-1,3-butadiene	0.0250	0.0266	0.0252	106	101	73.7-133			5.27	20
Isopropylbenzene	0.0250	0.0273	0.0248	109	99.3	81.6-124			9.47	20
p-Isopropyltoluene	0.0250	0.0277	0.0257	111	103	77.6-129			7.61	20
2-Butanone (MEK)	0.125	0.122	0.119	97.5	94.9	46.4-155			2.70	20
Methylene Chloride	0.0250	0.0248	0.0234	99.3	93.7	69.5-120			5.72	20
4-Methyl-2-pentanone (MIBK)	0.125	0.132	0.128	105	102	63.3-138			3.04	20
Methyl tert-butyl ether	0.0250	0.0245	0.0230	97.9	92.1	70.1-125			6.07	20
Naphthalene	0.0250	0.0262	0.0244	105	97.6	69.7-134			7.10	20
n-Propylbenzene	0.0250	0.0268	0.0246	107	98.5	81.9-122			8.60	20
Styrene	0.0250	0.0271	0.0252	108	101	79.9-124			7.02	20
1,1,1,2-Tetrachloroethane	0.0250	0.0274	0.0252	110	101	78.5-125			8.58	20
1,1,2,2-Tetrachloroethane	0.0250	0.0271	0.0252	109	101	79.3-123			7.59	20
Tetrachloroethene	0.0250	0.0281	0.0263	112	105	73.5-130			6.67	20
Toluene	0.0250	0.0258	0.0244	103	97.6	77.9-116			5.38	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0198	0.0188	79.3	75.0	62.0-141			5.56	20
1,2,3-Trichlorobenzene	0.0250	0.0271	0.0252	109	101	75.7-134			7.49	20
1,2,4-Trichlorobenzene	0.0250	0.0269	0.0246	107	98.4	76.1-136			8.82	20
1,1,1-Trichloroethane	0.0250	0.0253	0.0241	101	96.2	71.1-129			5.17	20
1,1,2-Trichloroethane	0.0250	0.0274	0.0252	110	101	81.6-120			8.25	20
Trichloroethene	0.0250	0.0268	0.0254	107	102	79.5-121			5.19	20
Trichlorofluoromethane	0.0250	0.0293	0.0281	117	113	49.1-157			3.98	20
1,2,3-Trichloropropane	0.0250	0.0291	0.0270	116	108	74.9-124			7.75	20
1,2,3-Trimethylbenzene	0.0250	0.0261	0.0238	105	95.2	79.9-118			9.32	20
1,2,4-Trimethylbenzene	0.0250	0.0267	0.0245	107	98.1	79.0-122			8.64	20
1,3,5-Trimethylbenzene	0.0250	0.0271	0.0248	108	99.3	81.0-123			8.81	20
Vinyl chloride	0.0250	0.0263	0.0255	105	102	61.5-134			3.22	20
Xylenes, Total	0.0750	0.0806	0.0737	107	98.3	79.2-122			8.84	20
(S) Toluene-d8				*95.7*	*97.2*	*90.0-115*				
(S) Dibromofluoromethane				*93.6*	*95.4*	*79.0-121*				
(S) 4-Bromofluorobenzene				*97.1*	*96.1*	*80.1-120*				

L800774-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/15/15 07:11 • (MS) 11/15/15 03:31 • (MSD) 11/15/15 04:35

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.00275	0.186	0.155	146	122	1	25.0-156			18.3	21.5
Acrolein	0.125	ND	3.24	2.87	2600	2300	1	34.0-194	J5	J5	12.1	21.5
Acrylonitrile	0.125	ND	0.140	0.125	112	100	1	55.9-161			11.4	20
Benzene	0.0250	ND	0.0237	0.0228	94.9	91.3	1	58.6-133			3.79	20
Bromobenzene	0.0250	ND	0.0247	0.0243	98.7	97.0	1	70.6-125			1.77	20
Bromodichloromethane	0.0250	ND	0.0255	0.0257	102	103	1	69.2-127			0.890	20
Bromoform	0.0250	ND	0.0286	0.0275	114	110	1	66.3-140			3.77	20
Bromomethane	0.0250	ND	0.0275	0.0266	110	106	1	16.6-183			3.30	20.5
n-Butylbenzene	0.0250	ND	0.0262	0.0251	105	100	1	64.8-145			4.22	20
sec-Butylbenzene	0.0250	ND	0.0263	0.0257	105	103	1	66.8-139			2.13	20
tert-Butylbenzene	0.0250	ND	0.0256	0.0251	102	100	1	67.1-138			2.15	20
Carbon tetrachloride	0.0250	ND	0.0220	0.0219	88.0	87.5	1	60.6-139			0.620	20
Chlorobenzene	0.0250	ND	0.0261	0.0259	104	104	1	70.1-130			0.740	20
Chlorodibromomethane	0.0250	ND	0.0268	0.0265	107	106	1	71.6-132			1.11	20
Chloroethane	0.0250	ND	0.0301	0.0285	120	114	1	33.3-155			5.27	20
2-Chloroethyl vinyl ether	0.125	ND	0.0475	0.00264	38.0	2.11	1	5.00-149		J3 J6	179	40
Chloroform	0.0250	ND	0.0238	0.0231	95.4	92.2	1	66.1-133			3.39	20
Chloromethane	0.0250	ND	0.0232	0.0217	92.7	87.0	1	40.7-139			6.34	20
2-Chlorotoluene	0.0250	ND	0.0251	0.0249	101	99.7	1	66.9-134			0.880	20
4-Chlorotoluene	0.0250	ND	0.0255	0.0254	102	101	1	66.8-134			0.340	20
1,2-Dibromo-3-Chloropropane	0.0250	ND	0.0301	0.0264	120	106	1	63.9-142			13.0	20.2
1,2-Dibromoethane	0.0250	ND	0.0276	0.0270	110	108	1	73.8-131			2.40	20
Dibromomethane	0.0250	ND	0.0269	0.0263	108	105	1	72.8-127			2.07	20
1,2-Dichlorobenzene	0.0250	ND	0.0261	0.0253	104	101	1	77.4-127			3.18	20
1,3-Dichlorobenzene	0.0250	ND	0.0271	0.0261	108	105	1	67.9-136			3.48	20
1,4-Dichlorobenzene	0.0250	ND	0.0265	0.0260	106	104	1	74.4-123			1.76	20
Dichlorodifluoromethane	0.0250	ND	0.0279	0.0262	111	105	1	42.2-146			6.03	20
1,1-Dichloroethane	0.0250	ND	0.0239	0.0229	95.6	91.7	1	64.0-134			4.14	20
1,2-Dichloroethane	0.0250	ND	0.0269	0.0257	108	103	1	60.7-132			4.76	20
1,1-Dichloroethene	0.0250	ND	0.0258	0.0247	103	98.9	1	48.8-144			4.30	20
cis-1,2-Dichloroethene	0.0250	ND	0.0246	0.0238	98.4	95.4	1	60.6-136			3.16	20
trans-1,2-Dichloroethene	0.0250	ND	0.0248	0.0236	99.2	94.5	1	61.0-132			4.88	20
1,2-Dichloropropane	0.0250	ND	0.0249	0.0248	99.6	99.3	1	69.7-130			0.340	20
1,1-Dichloropropene	0.0250	ND	0.0249	0.0240	99.7	96.1	1	61.5-136			3.73	20
1,3-Dichloropropane	0.0250	ND	0.0261	0.0260	104	104	1	74.3-123			0.470	20
cis-1,3-Dichloropropene	0.0250	ND	0.0254	0.0255	102	102	1	71.1-129			0.470	20

L800774-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/15/15 07:11 • (MS) 11/15/15 03:31 • (MSD) 11/15/15 04:35

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
trans-1,3-Dichloropropene	0.0250	ND	0.0265	0.0267	106	107	1	66.3-136			1.00	20
2,2-Dichloropropane	0.0250	ND	0.0229	0.0241	91.6	96.3	1	54.9-142			5.03	20
Di-isopropyl ether	0.0250	ND	0.0228	0.0222	91.3	88.7	1	59.9-140			2.88	20
Ethylbenzene	0.0250	ND	0.0255	0.0250	102	99.9	1	62.7-136			1.99	20
Hexachloro-1,3-butadiene	0.0250	ND	0.0262	0.0255	105	102	1	61.1-144			2.78	20.1
Isopropylbenzene	0.0250	ND	0.0258	0.0252	103	101	1	67.4-136			2.57	20
p-Isopropyltoluene	0.0250	ND	0.0269	0.0261	108	104	1	62.8-143			3.17	20
2-Butanone (MEK)	0.125	0.000642	0.154	0.130	123	103	1	45.0-156			17.3	20.8
Methylene Chloride	0.0250	ND	0.0236	0.0226	94.3	90.3	1	61.5-125			4.36	20
4-Methyl-2-pentanone (MIBK)	0.125	ND	0.144	0.133	115	107	1	60.7-150			7.40	20
Methyl tert-butyl ether	0.0250	ND	0.0248	0.0238	99.1	95.2	1	61.4-136			4.03	20
Naphthalene	0.0250	ND	0.0265	0.0251	106	100	1	61.8-143			5.66	20
n-Propylbenzene	0.0250	ND	0.0257	0.0254	103	102	1	63.2-139			1.31	20
Styrene	0.0250	ND	0.0257	0.0260	103	104	1	68.2-133			1.06	20
1,1,1,2-Tetrachloroethane	0.0250	ND	0.0258	0.0255	103	102	1	70.5-132			0.910	20
1,1,2,2-Tetrachloroethane	0.0250	ND	0.0280	0.0262	112	105	1	64.9-145			6.44	20
Tetrachloroethene	0.0250	ND	0.0267	0.0264	107	106	1	57.4-141			0.840	20
Toluene	0.0250	ND	0.0245	0.0252	98.1	101	1	67.8-124			2.71	20
1,1,2-Trichlorotrifluoroethane	0.0250	ND	0.0188	0.0229	75.3	91.6	1	53.7-150			19.5	20
1,2,3-Trichlorobenzene	0.0250	ND	0.0269	0.0260	108	104	1	65.7-143			3.76	20
1,2,4-Trichlorobenzene	0.0250	ND	0.0270	0.0264	108	106	1	67.0-146			2.29	20
1,1,1-Trichloroethane	0.0250	ND	0.0247	0.0242	98.9	96.6	1	58.7-134			2.32	20
1,1,2-Trichloroethane	0.0250	ND	0.0268	0.0261	107	104	1	74.1-130			2.46	20
Trichloroethene	0.0250	ND	0.0258	0.0255	103	102	1	48.9-148			1.30	20
Trichlorofluoromethane	0.0250	ND	0.0283	0.0284	113	114	1	39.9-165			0.540	20
1,2,3-Trichloropropane	0.0250	ND	0.0300	0.0278	120	111	1	71.5-134			7.46	20
1,2,3-Trimethylbenzene	0.0250	ND	0.0253	0.0247	101	98.8	1	62.7-133			2.55	20
1,2,4-Trimethylbenzene	0.0250	ND	0.0259	0.0255	103	102	1	60.5-137			1.23	20
1,3,5-Trimethylbenzene	0.0250	ND	0.0262	0.0256	105	102	1	67.9-134			2.54	20
Vinyl chloride	0.0250	ND	0.0259	0.0247	103	98.6	1	44.3-143			4.76	20
Xylenes, Total	0.0750	ND	0.0767	0.0755	102	101	1	65.6-133			1.56	20
(S) Toluene-d8					*96.2*	*97.8*		*90.0-115*				
(S) Dibromofluoromethane					*96.7*	*95.3*		*79.0-121*				
(S) 4-Bromofluorobenzene					*94.8*	*96.5*		*80.1-120*				

Method Blank (MB)

(MB) 11/17/15 06:08

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acetone	U		0.0100	0.0500
Acrylonitrile	U		0.00179	0.0100
Benzene	U		0.000270	0.00100
Bromobenzene	U		0.000284	0.00100
Bromodichloromethane	U		0.000254	0.00100
Bromoform	U		0.000424	0.00100
Bromomethane	U		0.00134	0.00500
n-Butylbenzene	U		0.000258	0.00100
sec-Butylbenzene	U		0.000201	0.00100
tert-Butylbenzene	U		0.000206	0.00100
Carbon tetrachloride	U		0.000328	0.00100
Chlorobenzene	U		0.000212	0.00100
Chlorodibromomethane	U		0.000373	0.00100
Chloroethane	U		0.000946	0.00500
2-Chloroethyl vinyl ether	U		0.00234	0.0500
Chloroform	U		0.000229	0.00500
Chloromethane	U		0.000375	0.00250
2-Chlorotoluene	U		0.000301	0.00100
4-Chlorotoluene	U		0.000240	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00105	0.00500
1,2-Dibromoethane	U		0.000343	0.00100
Dibromomethane	U		0.000382	0.00100
1,2-Dichlorobenzene	U		0.000305	0.00100
1,3-Dichlorobenzene	U		0.000239	0.00100
1,4-Dichlorobenzene	U		0.000226	0.00100
Dichlorodifluoromethane	U		0.000713	0.00500
1,1-Dichloroethane	U		0.000199	0.00100
1,2-Dichloroethane	U		0.000265	0.00100
1,1-Dichloroethene	U		0.000303	0.00100
cis-1,2-Dichloroethene	U		0.000235	0.00100
trans-1,2-Dichloroethene	U		0.000264	0.00100
1,2-Dichloropropane	U		0.000358	0.00100
1,1-Dichloropropene	U		0.000317	0.00100
1,3-Dichloropropane	U		0.000207	0.00100
cis-1,3-Dichloropropene	U		0.000262	0.00100
trans-1,3-Dichloropropene	U		0.000267	0.00100

Method Blank (MB)

(MB) 11/17/15 06:08

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
2,2-Dichloropropane	U		0.000279	0.00100
Di-isopropyl ether	U		0.000248	0.00100
Ethylbenzene	U		0.000297	0.00100
Hexachloro-1,3-butadiene	U		0.000342	0.00100
Isopropylbenzene	U		0.000243	0.00100
p-Isopropyltoluene	U		0.000204	0.00100
2-Butanone (MEK)	U		0.00468	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00188	0.0100
Methyl tert-butyl ether	U		0.000212	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000206	0.00100
Styrene	U		0.000234	0.00100
1,1,1,2-Tetrachloroethane	U		0.000264	0.00100
1,1,2,2-Tetrachloroethane	U		0.000365	0.00100
Tetrachloroethene	U		0.000276	0.00100
Toluene	U		0.000434	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000365	0.00100
1,2,3-Trichlorobenzene	U		0.000306	0.00100
1,2,4-Trichlorobenzene	U		0.000388	0.00100
1,1,1-Trichloroethane	U		0.000286	0.00100
1,1,2-Trichloroethane	U		0.000277	0.00100
Trichloroethene	U		0.000279	0.00100
Trichlorofluoromethane	U		0.000382	0.00500
1,2,3-Trichloropropane	U		0.000741	0.00250
1,2,3-Trimethylbenzene	U		0.000287	0.00100
1,2,4-Trimethylbenzene	U		0.000211	0.00100
1,3,5-Trimethylbenzene	U		0.000266	0.00100
Vinyl chloride	U		0.000291	0.00100
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	*99.8*			*88.7-115*
(S) Dibromofluoromethane	*89.8*			*76.3-123*
(S) 4-Bromofluorobenzene	*101*			*69.7-129*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/17/15 04:31 • (LCSD) 11/17/15 04:50

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.0959	0.0981	76.7	78.5	25.3-178			2.26	22.9
Acrylonitrile	0.125	0.114	0.119	91.0	95.1	57.8-143			4.45	20
Benzene	0.0250	0.0210	0.0210	83.9	84.2	72.6-120			0.330	20
Bromobenzene	0.0250	0.0246	0.0245	98.2	98.0	80.3-115			0.250	20
Bromodichloromethane	0.0250	0.0238	0.0237	95.3	94.7	75.3-119			0.580	20
Bromoform	0.0250	0.0259	0.0261	104	105	69.1-135			0.890	20
Bromomethane	0.0250	0.0315	0.0313	126	125	23.0-191			0.680	20
n-Butylbenzene	0.0250	0.0247	0.0248	98.9	99.2	74.2-134			0.300	20
sec-Butylbenzene	0.0250	0.0247	0.0245	98.9	98.1	77.8-129			0.880	20
tert-Butylbenzene	0.0250	0.0247	0.0247	99.0	98.7	77.2-129			0.290	20
Carbon tetrachloride	0.0250	0.0211	0.0206	84.4	82.3	69.4-129			2.50	20
Chlorobenzene	0.0250	0.0253	0.0249	101	99.5	78.9-122			1.67	20
Chlorodibromomethane	0.0250	0.0260	0.0264	104	106	76.4-126			1.47	20
Chloroethane	0.0250	0.0240	0.0238	95.8	95.3	47.2-147			0.480	20
2-Chloroethyl vinyl ether	0.125	0.128	0.129	102	103	16.7-162			1.04	23.7
Chloroform	0.0250	0.0221	0.0219	88.2	87.4	73.3-122			0.910	20
Chloromethane	0.0250	0.0144	0.0141	57.5	56.4	53.1-135			1.98	20
2-Chlorotoluene	0.0250	0.0248	0.0244	99.4	97.6	74.6-127			1.83	20
4-Chlorotoluene	0.0250	0.0248	0.0245	99.0	98.1	79.5-123			0.950	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0246	0.0266	98.4	107	64.9-131			7.97	20
1,2-Dibromoethane	0.0250	0.0253	0.0251	101	100	78.7-123			0.700	20
Dibromomethane	0.0250	0.0244	0.0246	97.8	98.3	78.5-117			0.560	20
1,2-Dichlorobenzene	0.0250	0.0240	0.0245	96.2	97.8	83.6-119			1.68	20
1,3-Dichlorobenzene	0.0250	0.0255	0.0257	102	103	75.9-129			0.810	20
1,4-Dichlorobenzene	0.0250	0.0238	0.0242	95.3	96.7	81.0-115			1.53	20
Dichlorodifluoromethane	0.0250	0.0200	0.0196	80.1	78.3	50.9-139			2.32	20
1,1-Dichloroethane	0.0250	0.0215	0.0217	85.8	86.9	71.7-125			1.30	20
1,2-Dichloroethane	0.0250	0.0224	0.0223	89.5	89.4	67.2-121			0.180	20
1,1-Dichloroethene	0.0250	0.0219	0.0219	87.6	87.8	60.6-133			0.180	20
cis-1,2-Dichloroethene	0.0250	0.0215	0.0209	85.9	83.8	76.1-121			2.50	20
trans-1,2-Dichloroethene	0.0250	0.0214	0.0213	85.7	85.1	70.7-124			0.700	20
1,2-Dichloropropane	0.0250	0.0241	0.0241	96.6	96.6	76.9-123			0.0100	20
1,1-Dichloropropene	0.0250	0.0208	0.0212	83.2	84.8	71.2-126			1.93	20
1,3-Dichloropropane	0.0250	0.0253	0.0251	101	100	80.3-114			1.00	20
cis-1,3-Dichloropropene	0.0250	0.0245	0.0243	97.9	97.1	77.3-123			0.850	20
trans-1,3-Dichloropropene	0.0250	0.0244	0.0246	97.5	98.2	73.0-127			0.780	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/17/15 04:31 • (LCSD) 11/17/15 04:50

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
2,2-Dichloropropane	0.0250	0.0218	0.0218	87.0	87.3	61.9-132			0.310	20
Di-isopropyl ether	0.0250	0.0223	0.0223	89.2	89.1	67.2-131			0.110	20
Ethylbenzene	0.0250	0.0254	0.0250	101	100	78.6-124			1.31	20
Hexachloro-1,3-butadiene	0.0250	0.0250	0.0249	100	99.6	69.2-136			0.450	20
Isopropylbenzene	0.0250	0.0248	0.0246	99.2	98.4	79.4-126			0.730	20
p-Isopropyltoluene	0.0250	0.0253	0.0252	101	101	75.4-132			0.260	20
2-Butanone (MEK)	0.125	0.102	0.107	81.9	85.9	44.5-154			4.80	21.3
Methylene Chloride	0.0250	0.0193	0.0191	77.1	76.5	68.2-119			0.780	20
4-Methyl-2-pentanone (MIBK)	0.125	0.127	0.132	102	106	61.1-138			3.44	20
Methyl tert-butyl ether	0.0250	0.0220	0.0225	88.0	89.8	70.2-122			2.02	20
Naphthalene	0.0250	0.0244	0.0252	97.6	101	69.9-132			3.30	20
n-Propylbenzene	0.0250	0.0251	0.0251	100	100	80.2-124			0.270	20
Styrene	0.0250	0.0259	0.0259	103	104	79.4-124			0.170	20
1,1,1,2-Tetrachloroethane	0.0250	0.0263	0.0259	105	103	76.7-127			1.74	20
1,1,2,2-Tetrachloroethane	0.0250	0.0263	0.0268	105	107	78.8-124			1.70	20
Tetrachloroethene	0.0250	0.0262	0.0262	105	105	71.1-133			0.000	20
Toluene	0.0250	0.0234	0.0233	93.5	93.4	76.7-116			0.0800	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0215	0.0214	85.9	85.7	62.6-138			0.280	20
1,2,3-Trichlorobenzene	0.0250	0.0250	0.0253	100	101	72.5-137			1.13	20
1,2,4-Trichlorobenzene	0.0250	0.0256	0.0263	102	105	74.0-137			2.79	20
1,1,1-Trichloroethane	0.0250	0.0218	0.0217	87.4	86.9	69.9-127			0.580	20
1,1,2-Trichloroethane	0.0250	0.0251	0.0250	100	100	81.9-119			0.250	20
Trichloroethene	0.0250	0.0244	0.0244	97.4	97.7	77.2-122			0.300	20
Trichlorofluoromethane	0.0250	0.0221	0.0222	88.4	89.0	51.5-151			0.710	20
1,2,3-Trichloropropane	0.0250	0.0267	0.0269	107	108	74.0-124			0.850	20
1,2,3-Trimethylbenzene	0.0250	0.0238	0.0239	95.3	95.5	79.4-118			0.230	20
1,2,4-Trimethylbenzene	0.0250	0.0257	0.0251	103	101	77.1-124			2.10	20
1,3,5-Trimethylbenzene	0.0250	0.0253	0.0248	101	99.1	79.0-125			2.17	20
Vinyl chloride	0.0250	0.0210	0.0208	84.1	83.0	58.4-134			1.32	20
Xylenes, Total	0.0750	0.0746	0.0747	99.5	99.5	78.1-123			0.0200	20
(S) Toluene-d8				*99.7*	*98.9*	*88.7-115*				
(S) Dibromofluoromethane				*86.7*	*88.5*	*76.3-123*				
(S) 4-Bromofluorobenzene				*102*	*101*	*69.7-129*				

L800946-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/17/15 11:04 • (MS) 11/17/15 10:06 • (MSD) 11/17/15 10:25

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.00695	0.367	0.373	57.7	58.6	5	10.0-130			1.55	31.5
Acrylonitrile	0.125	ND	0.446	0.464	71.4	74.2	5	39.3-152			3.77	27.2
Benzene	0.0250	ND	0.0806	0.0849	64.5	67.9	5	47.8-131			5.14	22.8
Bromobenzene	0.0250	0.00106	0.0764	0.0783	60.2	61.8	5	40.0-130			2.45	27.4
Bromodichloromethane	0.0250	ND	0.0869	0.0925	69.5	74.0	5	50.6-128			6.24	22.8
Bromoform	0.0250	ND	0.0846	0.0898	67.7	71.9	5	43.3-139			6.03	25.9
Bromomethane	0.0250	ND	0.123	0.134	98.3	107	5	5.00-189			8.51	26.7
n-Butylbenzene	0.0250	ND	0.0473	0.0445	37.8	35.6	5	23.6-146			6.03	39.2
sec-Butylbenzene	0.0250	ND	0.0539	0.0525	43.1	42.0	5	31.0-142			2.51	34.7
tert-Butylbenzene	0.0250	ND	0.0614	0.0610	49.1	48.8	5	36.9-142			0.690	31.7
Carbon tetrachloride	0.0250	ND	0.0756	0.0784	60.4	62.7	5	46.0-140			3.67	27.2
Chlorobenzene	0.0250	ND	0.0846	0.0867	67.6	69.4	5	44.1-134			2.51	25.7
Chlorodibromomethane	0.0250	ND	0.0905	0.0975	72.4	78.0	5	49.7-134			7.53	24
Chloroethane	0.0250	ND	0.0929	0.104	74.3	82.8	5	5.00-164			10.8	28.4
2-Chloroethyl vinyl ether	0.125	ND	0.459	0.482	73.5	77.1	5	5.00-159			4.78	40
Chloroform	0.0250	ND	0.0842	0.0905	67.3	72.4	5	51.2-133			7.20	22.8
Chloromethane	0.0250	ND	0.0557	0.0615	44.6	49.2	5	31.4-141			9.81	24.6
2-Chlorotoluene	0.0250	ND	0.0709	0.0746	56.7	59.7	5	36.1-137			5.15	28.9
4-Chlorotoluene	0.0250	ND	0.0704	0.0722	56.3	57.8	5	35.4-137			2.58	29.8
1,2-Dibromo-3-Chloropropane	0.0250	ND	0.0733	0.0760	58.6	60.8	5	40.4-138			3.58	30.8
1,2-Dibromoethane	0.0250	ND	0.0932	0.0946	74.6	75.7	5	50.2-133			1.44	23.6
Dibromomethane	0.0250	ND	0.0909	0.0957	72.7	76.6	5	52.4-128			5.21	23
1,2-Dichlorobenzene	0.0250	ND	0.0649	0.0672	51.9	53.7	5	34.6-139			3.40	29.9
1,3-Dichlorobenzene	0.0250	ND	0.0675	0.0670	54.0	53.6	5	28.4-142			0.700	31.2
1,4-Dichlorobenzene	0.0250	ND	0.0649	0.0643	52.0	51.5	5	35.0-133			0.950	31.1
Dichlorodifluoromethane	0.0250	ND	0.0775	0.0821	62.0	65.7	5	31.2-144			5.68	30.2
1,1-Dichloroethane	0.0250	ND	0.0862	0.0918	69.0	73.5	5	49.1-136			6.33	22.9
1,2-Dichloroethane	0.0250	ND	0.0845	0.0900	67.6	72.0	5	47.1-129			6.31	22.7
1,1-Dichloroethene	0.0250	ND	0.0855	0.0906	68.4	72.5	5	36.1-142			5.73	25.6
cis-1,2-Dichloroethene	0.0250	ND	0.0816	0.0860	65.3	68.8	5	50.6-133			5.24	23
trans-1,2-Dichloroethene	0.0250	ND	0.0850	0.0912	68.0	73.0	5	43.8-135			7.03	24.8
1,2-Dichloropropane	0.0250	0.00878	0.0899	0.0933	64.9	67.6	5	50.3-134			3.73	22.7
1,1-Dichloropropene	0.0250	ND	0.0786	0.0823	62.9	65.8	5	43.0-137			4.48	26.4
1,3-Dichloropropane	0.0250	ND	0.0919	0.0946	73.5	75.7	5	51.4-127			2.92	23.1
cis-1,3-Dichloropropene	0.0250	ND	0.0885	0.0931	70.8	74.5	5	48.4-134			5.07	23.6
trans-1,3-Dichloropropene	0.0250	0.00436	0.0874	0.0925	66.4	70.5	5	46.6-135			5.71	25.3

L800946-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/17/15 11:04 • (MS) 11/17/15 10:06 • (MSD) 11/17/15 10:25

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
2,2-Dichloropropane	0.0250	ND	0.0861	0.0909	68.8	72.7	5	45.2-141			5.44	26.6
Di-isopropyl ether	0.0250	ND	0.0850	0.0915	68.0	73.2	5	46.7-140			7.39	23.5
Ethylbenzene	0.0250	ND	0.0813	0.0844	65.1	67.5	5	44.8-135			3.71	26.9
Hexachloro-1,3-butadiene	0.0250	ND	0.0262	0.0217	20.9	17.4	5	10.0-149			18.6	40
Isopropylbenzene	0.0250	ND	0.0715	0.0713	57.2	57.0	5	41.9-139			0.320	29.3
p-Isopropyltoluene	0.0250	ND	0.0545	0.0528	43.6	42.2	5	27.3-146			3.17	35.1
2-Butanone (MEK)	0.125	0.000811	0.382	0.392	61.0	62.5	5	23.9-170			2.52	28.3
Methylene Chloride	0.0250	0.000560	0.0745	0.0792	59.2	62.9	5	46.7-125			6.05	22.2
4-Methyl-2-pentanone (MIBK)	0.125	0.000670	0.481	0.492	76.9	78.5	5	42.4-146			2.08	26.7
Methyl tert-butyl ether	0.0250	ND	0.0834	0.0902	66.7	72.1	5	50.4-131			7.77	24.8
Naphthalene	0.0250	0.00210	0.0527	0.0550	40.5	42.3	5	18.4-145			4.40	34
n-Propylbenzene	0.0250	ND	0.0676	0.0665	54.1	53.2	5	35.2-139			1.65	31.9
Styrene	0.0250	ND	0.0846	0.0866	67.7	69.2	5	39.7-137			2.30	28.2
1,1,1,2-Tetrachloroethane	0.0250	ND	0.0902	0.0950	72.2	76.0	5	48.8-136			5.14	25.5
1,1,2,2-Tetrachloroethane	0.0250	ND	0.0895	0.0919	71.6	73.5	5	45.7-140			2.61	26.4
Tetrachloroethene	0.0250	ND	0.0823	0.0821	65.9	65.7	5	37.7-140			0.220	29.2
Toluene	0.0250	0.000418	0.0839	0.0867	66.8	69.1	5	47.8-127			3.35	24.3
1,1,2-Trichlorotrifluoroethane	0.0250	ND	0.0751	0.0784	60.1	62.7	5	35.7-146			4.32	28.8
1,2,3-Trichlorobenzene	0.0250	ND	0.0349	0.0350	27.9	28.0	5	10.0-150			0.320	38.5
1,2,4-Trichlorobenzene	0.0250	ND	0.0401	0.0388	32.1	31.1	5	10.0-153			3.29	39.3
1,1,1-Trichloroethane	0.0250	ND	0.0840	0.0879	67.2	70.3	5	49.0-138			4.61	25.3
1,1,2-Trichloroethane	0.0250	ND	0.0913	0.0940	73.1	75.2	5	52.3-132			2.90	23.4
Trichloroethene	0.0250	ND	0.0880	0.0920	70.4	73.6	5	48.0-132			4.49	24.8
Trichlorofluoromethane	0.0250	ND	0.0846	0.0904	67.7	72.3	5	12.8-169			6.60	29.7
1,2,3-Trichloropropane	0.0250	ND	0.0928	0.0963	74.2	77.1	5	44.4-138			3.77	26.3
1,2,3-Trimethylbenzene	0.0250	ND	0.0659	0.0672	52.7	53.7	5	41.0-133			1.93	27.6
1,2,4-Trimethylbenzene	0.0250	0.000597	0.0679	0.0684	53.9	54.3	5	32.9-139			0.770	30.6
1,3,5-Trimethylbenzene	0.0250	ND	0.0668	0.0671	53.5	53.7	5	37.1-138			0.470	30.6
Vinyl chloride	0.0250	ND	0.0864	0.0920	69.1	73.6	5	32.0-146			6.25	26.3
Xylenes, Total	0.0750	0.000610	0.239	0.244	63.6	64.8	5	42.7-135			1.89	26.6
(S) Toluene-d8					*99.4*	*99.8*		*88.7-115*				
(S) Dibromofluoromethane					*88.3*	*88.3*		*76.3-123*				
(S) 4-Bromofluorobenzene					*101*	*99.8*		*69.7-129*				

Method Blank (MB)

(MB) 11/20/15 11:40

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrolein	U		0.00887	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromobenzene	U		0.000352	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
n-Butylbenzene	U		0.000361	0.00100
sec-Butylbenzene	U		0.000365	0.00100
tert-Butylbenzene	U		0.000399	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
2-Chloroethyl vinyl ether	U		0.00301	0.0500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
2-Chlorotoluene	U		0.000375	0.00100
4-Chlorotoluene	U		0.000351	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,3-Dichlorobenzene	U		0.000220	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
Dichlorodifluoromethane	U		0.000551	0.00500
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
1,1-Dichloropropene	U		0.000352	0.00100
1,3-Dichloropropane	U		0.000366	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100

Method Blank (MB)

(MB) 11/20/15 11:40

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
trans-1,3-Dichloropropene	U		0.000419	0.00100
2,2-Dichloropropane	U		0.000321	0.00100
Di-isopropyl ether	U		0.000320	0.00100
Ethylbenzene	U		0.000384	0.00100
Hexachloro-1,3-butadiene	U		0.000256	0.00100
Isopropylbenzene	U		0.000326	0.00100
p-Isopropyltoluene	U		0.000350	0.00100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Methyl tert-butyl ether	U		0.000367	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000349	0.00100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000780	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100
1,2,3-Trichlorobenzene	U		0.000230	0.00100
1,2,4-Trichlorobenzene	U		0.000355	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
1,2,3-Trimethylbenzene	U		0.000321	0.00100
1,2,4-Trimethylbenzene	U		0.000373	0.00100
1,3,5-Trimethylbenzene	U		0.000387	0.00100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*106*			*90.0-115*
(S) Dibromofluoromethane	*107*			*79.0-121*
(S) 4-Bromofluorobenzene	*98.9*			*80.1-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/20/15 09:59 • (LCSD) 11/20/15 10:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.141	0.162	113	130	28.7-175			14.2	20.9
Acrolein	0.125	0.131	0.159	105	127	40.4-172			19.1	20
Acrylonitrile	0.125	0.121	0.141	96.8	113	58.2-145			15.4	20
Benzene	0.0250	0.0246	0.0261	98.5	104	73.0-122			5.66	20
Bromobenzene	0.0250	0.0241	0.0244	96.2	97.5	81.5-115			1.28	20
Bromodichloromethane	0.0250	0.0239	0.0257	95.4	103	75.5-121			7.59	20
Bromoform	0.0250	0.0231	0.0259	92.2	103	71.5-131			11.5	20
Bromomethane	0.0250	0.0231	0.0241	92.5	96.5	22.4-187			4.25	20
n-Butylbenzene	0.0250	0.0260	0.0265	104	106	75.9-134			1.92	20
sec-Butylbenzene	0.0250	0.0265	0.0262	106	105	80.6-126			1.43	20
tert-Butylbenzene	0.0250	0.0256	0.0250	103	100	79.3-127			2.37	20
Carbon tetrachloride	0.0250	0.0254	0.0269	101	107	70.9-129			5.69	20
Chlorobenzene	0.0250	0.0245	0.0247	98.1	99.0	79.7-122			0.900	20
Chlorodibromomethane	0.0250	0.0217	0.0228	86.7	91.1	78.2-124			5.02	20
Chloroethane	0.0250	0.0252	0.0247	101	98.7	41.2-153			2.23	20
2-Chloroethyl vinyl ether	0.125	0.280	0.308	224	247	23.4-162	J4	J4	9.60	23.5
Chloroform	0.0250	0.0244	0.0259	97.5	104	73.2-125			6.14	20
Chloromethane	0.0250	0.0246	0.0240	98.6	96.1	55.8-134			2.58	20
2-Chlorotoluene	0.0250	0.0239	0.0240	95.6	96.1	76.4-125			0.460	20
4-Chlorotoluene	0.0250	0.0247	0.0252	98.7	101	81.5-121			1.96	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0228	0.0265	91.4	106	64.8-131			14.9	20
1,2-Dibromoethane	0.0250	0.0230	0.0251	92.1	100	79.8-122			8.60	20
Dibromomethane	0.0250	0.0247	0.0264	98.7	106	79.5-118			6.62	20
1,2-Dichlorobenzene	0.0250	0.0244	0.0261	97.7	104	84.7-118			6.45	20
1,3-Dichlorobenzene	0.0250	0.0248	0.0254	99.2	102	77.6-127			2.45	20
1,4-Dichlorobenzene	0.0250	0.0231	0.0247	92.5	98.9	82.2-114			6.72	20
Dichlorodifluoromethane	0.0250	0.0256	0.0258	102	103	56.0-134			0.600	20
1,1-Dichloroethane	0.0250	0.0242	0.0258	96.6	103	71.7-127			6.63	20
1,2-Dichloroethane	0.0250	0.0256	0.0282	102	113	65.3-126			9.84	20
1,1-Dichloroethene	0.0250	0.0246	0.0261	98.4	104	59.9-137			5.87	20
cis-1,2-Dichloroethene	0.0250	0.0247	0.0268	98.7	107	77.3-122			8.38	20
trans-1,2-Dichloroethene	0.0250	0.0290	0.0260	116	104	72.6-125			10.7	20
1,2-Dichloropropane	0.0250	0.0257	0.0267	103	107	77.4-125			3.90	20
1,1-Dichloropropene	0.0250	0.0248	0.0258	99.2	103	72.5-127			3.85	20
1,3-Dichloropropane	0.0250	0.0244	0.0249	97.6	99.8	80.6-115			2.20	20
cis-1,3-Dichloropropene	0.0250	0.0234	0.0250	93.7	100	77.7-124			6.63	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/20/15 09:59 • (LCSD) 11/20/15 10:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
trans-1,3-Dichloropropene	0.0250	0.0241	0.0247	96.4	98.9	73.5-127			2.59	20
2,2-Dichloropropane	0.0250	0.0234	0.0257	93.5	103	61.3-134			9.60	20
Di-isopropyl ether	0.0250	0.0243	0.0258	97.3	103	65.1-135			5.86	20
Ethylbenzene	0.0250	0.0249	0.0251	99.7	100	80.9-121			0.590	20
Hexachloro-1,3-butadiene	0.0250	0.0235	0.0256	93.8	102	73.7-133			8.59	20
Isopropylbenzene	0.0250	0.0250	0.0247	100	98.9	81.6-124			1.08	20
p-Isopropyltoluene	0.0250	0.0263	0.0259	105	104	77.6-129			1.63	20
2-Butanone (MEK)	0.125	0.125	0.148	100	119	46.4-155			16.7	20
Methylene Chloride	0.0250	0.0261	0.0275	105	110	69.5-120			4.88	20
4-Methyl-2-pentanone (MIBK)	0.125	0.122	0.144	97.9	115	63.3-138			15.9	20
Methyl tert-butyl ether	0.0250	0.0248	0.0260	99.3	104	70.1-125			4.65	20
Naphthalene	0.0250	0.0231	0.0272	92.3	109	69.7-134			16.3	20
n-Propylbenzene	0.0250	0.0251	0.0250	100	100	81.9-122			0.390	20
Styrene	0.0250	0.0254	0.0255	101	102	79.9-124			0.490	20
1,1,1,2-Tetrachloroethane	0.0250	0.0253	0.0258	101	103	78.5-125			1.98	20
1,1,2,2-Tetrachloroethane	0.0250	0.0255	0.0277	102	111	79.3-123			8.31	20
Tetrachloroethene	0.0250	0.0263	0.0247	105	98.7	73.5-130			6.51	20
Toluene	0.0250	0.0252	0.0249	101	99.8	77.9-116			0.920	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0265	0.0267	106	107	62.0-141			1.05	20
1,2,3-Trichlorobenzene	0.0250	0.0233	0.0271	93.2	109	75.7-134			15.2	20
1,2,4-Trichlorobenzene	0.0250	0.0245	0.0267	98.0	107	76.1-136			8.62	20
1,1,1-Trichloroethane	0.0250	0.0247	0.0252	98.6	101	71.1-129			2.20	20
1,1,2-Trichloroethane	0.0250	0.0261	0.0273	105	109	81.6-120			4.33	20
Trichloroethene	0.0250	0.0246	0.0249	98.5	99.4	79.5-121			0.900	20
Trichlorofluoromethane	0.0250	0.0259	0.0272	104	109	49.1-157			4.88	20
1,2,3-Trichloropropane	0.0250	0.0247	0.0278	98.6	111	74.9-124			12.1	20
1,2,3-Trimethylbenzene	0.0250	0.0240	0.0254	95.9	101	79.9-118			5.62	20
1,2,4-Trimethylbenzene	0.0250	0.0249	0.0255	99.6	102	79.0-122			2.22	20
1,3,5-Trimethylbenzene	0.0250	0.0253	0.0257	101	103	81.0-123			1.86	20
Vinyl chloride	0.0250	0.0259	0.0261	104	104	61.5-134			0.570	20
Xylenes, Total	0.0750	0.0744	0.0738	99.2	98.4	79.2-122			0.800	20
(S) Toluene-d8				*106*	*103*	*90.0-115*				
(S) Dibromofluoromethane				*103*	*109*	*79.0-121*				
(S) 4-Bromofluorobenzene				*98.5*	*92.8*	*80.1-120*				

L800242-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/20/15 14:26 • (MS) 11/20/15 14:43 • (MSD) 11/20/15 15:01

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.00109	0.0545	0.0516	42.7	40.4	1	25.0-156			5.44	21.5
Acrolein	0.125	0.00107	0.130	0.119	103	94.0	1	34.0-194			9.05	21.5
Acrylonitrile	0.125	ND	0.135	0.127	108	102	1	55.9-161			6.12	20
Benzene	0.0250	ND	0.0253	0.0246	101	98.6	1	58.6-133			2.53	20
Bromobenzene	0.0250	ND	0.0261	0.0238	104	95.1	1	70.6-125			9.27	20
Bromodichloromethane	0.0250	ND	0.0256	0.0246	102	98.5	1	69.2-127			3.98	20
Bromoform	0.0250	ND	0.0273	0.0242	109	96.7	1	66.3-140			12.3	20
Bromomethane	0.0250	ND	0.0219	0.0217	87.6	87.0	1	16.6-183			0.740	20.5
n-Butylbenzene	0.0250	ND	0.0285	0.0269	114	107	1	64.8-145			6.02	20
sec-Butylbenzene	0.0250	ND	0.0296	0.0270	118	108	1	66.8-139			9.30	20
tert-Butylbenzene	0.0250	ND	0.0282	0.0257	113	103	1	67.1-138			9.05	20
Carbon tetrachloride	0.0250	ND	0.0268	0.0259	107	104	1	60.6-139			3.44	20
Chlorobenzene	0.0250	ND	0.0264	0.0238	106	95.3	1	70.1-130			10.4	20
Chlorodibromomethane	0.0250	ND	0.0247	0.0228	98.6	91.2	1	71.6-132			7.79	20
Chloroethane	0.0250	ND	0.0237	0.0225	94.9	90.0	1	33.3-155			5.33	20
2-Chloroethyl vinyl ether	0.125	ND	0.00199	0.00353	1.59	2.82	1	5.00-149	J6	J3 J6	55.9	40
Chloroform	0.0250	ND	0.0259	0.0252	104	101	1	66.1-133			3.05	20
Chloromethane	0.0250	ND	0.0212	0.0201	84.7	80.4	1	40.7-139			5.15	20
2-Chlorotoluene	0.0250	ND	0.0264	0.0221	106	88.6	1	66.9-134			17.7	20
4-Chlorotoluene	0.0250	ND	0.0267	0.0248	107	99.2	1	66.8-134			7.50	20
1,2-Dibromo-3-Chloropropane	0.0250	ND	0.0248	0.0245	99.2	98.2	1	63.9-142			1.05	20.2
1,2-Dibromoethane	0.0250	ND	0.0249	0.0230	99.6	91.9	1	73.8-131			8.04	20
Dibromomethane	0.0250	0.000554	0.0267	0.0257	105	101	1	72.8-127			3.67	20
1,2-Dichlorobenzene	0.0250	ND	0.0263	0.0254	105	102	1	77.4-127			3.68	20
1,3-Dichlorobenzene	0.0250	ND	0.0275	0.0244	110	97.4	1	67.9-136			12.0	20
1,4-Dichlorobenzene	0.0250	ND	0.0248	0.0236	99.4	94.4	1	74.4-123			5.17	20
Dichlorodifluoromethane	0.0250	ND	0.0265	0.0252	106	101	1	42.2-146			5.08	20
1,1-Dichloroethane	0.0250	ND	0.0257	0.0249	103	99.7	1	64.0-134			2.92	20
1,2-Dichloroethane	0.0250	ND	0.0275	0.0260	110	104	1	60.7-132			5.34	20
1,1-Dichloroethene	0.0250	ND	0.0248	0.0233	99.3	93.2	1	48.8-144			6.39	20
cis-1,2-Dichloroethene	0.0250	ND	0.0263	0.0248	105	99.2	1	60.6-136			5.93	20
trans-1,2-Dichloroethene	0.0250	ND	0.0226	0.0222	90.2	88.6	1	61.0-132			1.79	20
1,2-Dichloropropane	0.0250	0.00204	0.0270	0.0266	99.9	98.2	1	69.7-130			1.57	20
1,1-Dichloropropene	0.0250	ND	0.0247	0.0242	98.9	96.9	1	61.5-136			2.02	20
1,3-Dichloropropane	0.0250	ND	0.0274	0.0235	109	93.9	1	74.3-123			15.3	20
cis-1,3-Dichloropropene	0.0250	ND	0.0234	0.0231	93.5	92.3	1	71.1-129			1.37	20

L800242-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/20/15 14:26 • (MS) 11/20/15 14:43 • (MSD) 11/20/15 15:01

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
trans-1,3-Dichloropropene	0.0250	0.000794	0.0247	0.0238	95.5	91.9	1	66.3-136			3.68	20
2,2-Dichloropropane	0.0250	ND	0.0266	0.0255	107	102	1	54.9-142			4.14	20
Di-isopropyl ether	0.0250	0.000492	0.0264	0.0248	104	97.4	1	59.9-140			6.18	20
Ethylbenzene	0.0250	ND	0.0270	0.0247	108	98.6	1	62.7-136			8.99	20
Hexachloro-1,3-butadiene	0.0250	ND	0.0268	0.0247	107	98.7	1	61.1-144			8.14	20.1
Isopropylbenzene	0.0250	ND	0.0277	0.0254	111	102	1	67.4-136			8.70	20
p-Isopropyltoluene	0.0250	ND	0.0289	0.0264	116	106	1	62.8-143			9.17	20
2-Butanone (MEK)	0.125	0.000790	0.0917	0.0844	72.8	66.9	1	45.0-156			8.37	20.8
Methylene Chloride	0.0250	0.00106	0.0228	0.0211	87.0	80.3	1	61.5-125			7.59	20
4-Methyl-2-pentanone (MIBK)	0.125	0.000602	0.133	0.125	106	99.8	1	60.7-150			5.79	20
Methyl tert-butyl ether	0.0250	0.000446	0.0250	0.0248	98.4	97.4	1	61.4-136			1.00	20
Naphthalene	0.0250	ND	0.0263	0.0250	105	100	1	61.8-143			4.98	20
n-Propylbenzene	0.0250	ND	0.0278	0.0258	111	103	1	63.2-139			7.67	20
Styrene	0.0250	ND	0.0272	0.0248	109	99.3	1	68.2-133			9.24	20
1,1,1,2-Tetrachloroethane	0.0250	ND	0.0271	0.0252	109	101	1	70.5-132			7.37	20
1,1,2,2-Tetrachloroethane	0.0250	ND	0.0285	0.0264	114	105	1	64.9-145			7.80	20
Tetrachloroethene	0.0250	ND	0.0272	0.0243	109	97.4	1	57.4-141			11.0	20
Toluene	0.0250	ND	0.0250	0.0239	99.9	95.7	1	67.8-124			4.27	20
1,1,2-Trichlorotrifluoroethane	0.0250	ND	0.0296	0.0270	118	108	1	53.7-150			9.12	20
1,2,3-Trichlorobenzene	0.0250	ND	0.0257	0.0251	103	101	1	65.7-143			2.05	20
1,2,4-Trichlorobenzene	0.0250	ND	0.0260	0.0261	104	104	1	67.0-146			0.370	20
1,1,1-Trichloroethane	0.0250	ND	0.0261	0.0250	104	99.9	1	58.7-134			4.20	20
1,1,2-Trichloroethane	0.0250	ND	0.0285	0.0257	114	103	1	74.1-130			10.1	20
Trichloroethene	0.0250	ND	0.0248	0.0239	99.1	95.7	1	48.9-148			3.46	20
Trichlorofluoromethane	0.0250	ND	0.0267	0.0259	107	104	1	39.9-165			2.92	20
1,2,3-Trichloropropane	0.0250	ND	0.0287	0.0242	115	97.0	1	71.5-134			16.8	20
1,2,3-Trimethylbenzene	0.0250	ND	0.0262	0.0246	105	98.3	1	62.7-133			6.17	20
1,2,4-Trimethylbenzene	0.0250	ND	0.0270	0.0243	108	97.3	1	60.5-137			10.5	20
1,3,5-Trimethylbenzene	0.0250	ND	0.0275	0.0251	110	101	1	67.9-134			9.09	20
Vinyl chloride	0.0250	ND	0.0240	0.0229	95.9	91.7	1	44.3-143			4.47	20
Xylenes, Total	0.0750	ND	0.0807	0.0730	108	97.3	1	65.6-133			10.1	20
(S) Toluene-d8					*105*	*107*		*90.0-115*				
(S) Dibromofluoromethane					*107*	*106*		*79.0-121*				
(S) 4-Bromofluorobenzene					*101*	*95.2*		*80.1-120*				

Method Blank (MB)

(MB) 11/20/15 05:43

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acetone	U		0.0100	0.0500
Acrylonitrile	U		0.00179	0.0100
Benzene	U		0.000270	0.00100
Bromobenzene	U		0.000284	0.00100
Bromodichloromethane	U		0.000254	0.00100
Bromoform	U		0.000424	0.00100
Bromomethane	U		0.00134	0.00500
n-Butylbenzene	U		0.000258	0.00100
sec-Butylbenzene	U		0.000201	0.00100
tert-Butylbenzene	U		0.000206	0.00100
Carbon tetrachloride	U		0.000328	0.00100
Chlorobenzene	U		0.000212	0.00100
Chlorodibromomethane	U		0.000373	0.00100
Chloroethane	U		0.000946	0.00500
2-Chloroethyl vinyl ether	U		0.00234	0.0500
Chloroform	U		0.000229	0.00500
Chloromethane	U		0.000375	0.00250
2-Chlorotoluene	U		0.000301	0.00100
4-Chlorotoluene	U		0.000240	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00105	0.00500
1,2-Dibromoethane	U		0.000343	0.00100
Dibromomethane	U		0.000382	0.00100
1,2-Dichlorobenzene	U		0.000305	0.00100
1,3-Dichlorobenzene	U		0.000239	0.00100
1,4-Dichlorobenzene	U		0.000226	0.00100
Dichlorodifluoromethane	U		0.000713	0.00500
1,1-Dichloroethane	U		0.000199	0.00100
1,2-Dichloroethane	U		0.000265	0.00100
1,1-Dichloroethene	U		0.000303	0.00100
cis-1,2-Dichloroethene	U		0.000235	0.00100
trans-1,2-Dichloroethene	U		0.000264	0.00100
1,2-Dichloropropane	U		0.000358	0.00100
1,1-Dichloropropene	U		0.000317	0.00100
1,3-Dichloropropane	U		0.000207	0.00100
cis-1,3-Dichloropropene	U		0.000262	0.00100
trans-1,3-Dichloropropene	U		0.000267	0.00100

Method Blank (MB)

(MB) 11/20/15 05:43

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
2,2-Dichloropropane	U		0.000279	0.00100
Di-isopropyl ether	U		0.000248	0.00100
Ethylbenzene	U		0.000297	0.00100
Hexachloro-1,3-butadiene	U		0.000342	0.00100
Isopropylbenzene	U		0.000243	0.00100
p-Isopropyltoluene	U		0.000204	0.00100
2-Butanone (MEK)	U		0.00468	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00188	0.0100
Methyl tert-butyl ether	U		0.000212	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000206	0.00100
Styrene	U		0.000234	0.00100
1,1,1,2-Tetrachloroethane	U		0.000264	0.00100
1,1,2,2-Tetrachloroethane	U		0.000365	0.00100
Tetrachloroethene	U		0.000276	0.00100
Toluene	U		0.000434	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000365	0.00100
1,2,3-Trichlorobenzene	U		0.000306	0.00100
1,2,4-Trichlorobenzene	U		0.000388	0.00100
1,1,1-Trichloroethane	U		0.000286	0.00100
1,1,2-Trichloroethane	U		0.000277	0.00100
Trichloroethene	U		0.000279	0.00100
Trichlorofluoromethane	U		0.000382	0.00500
1,2,3-Trichloropropane	U		0.000741	0.00250
1,2,3-Trimethylbenzene	U		0.000287	0.00100
1,2,4-Trimethylbenzene	U		0.000211	0.00100
1,3,5-Trimethylbenzene	U		0.000266	0.00100
Vinyl chloride	U		0.000291	0.00100
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	*102*			*88.7-115*
(S) Dibromofluoromethane	*101*			*76.3-123*
(S) 4-Bromofluorobenzene	*99.1*			*69.7-129*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/20/15 03:32 • (LCSD) 11/20/15 03:51

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.108	0.112	86.2	89.6	25.3-178			3.85	22.9
Acrylonitrile	0.125	0.145	0.143	116	114	57.8-143			1.70	20
Benzene	0.0250	0.0270	0.0255	108	102	72.6-120			5.56	20
Bromobenzene	0.0250	0.0256	0.0248	102	99.4	80.3-115			3.00	20
Bromodichloromethane	0.0250	0.0283	0.0269	113	108	75.3-119			5.28	20
Bromoform	0.0250	0.0268	0.0248	107	99.1	69.1-135			7.81	20
Bromomethane	0.0250	0.0244	0.0229	97.6	91.6	23.0-191			6.31	20
n-Butylbenzene	0.0250	0.0278	0.0262	111	105	74.2-134			5.95	20
sec-Butylbenzene	0.0250	0.0277	0.0257	111	103	77.8-129			7.72	20
tert-Butylbenzene	0.0250	0.0276	0.0257	110	103	77.2-129			7.09	20
Carbon tetrachloride	0.0250	0.0268	0.0251	107	100	69.4-129			6.52	20
Chlorobenzene	0.0250	0.0261	0.0242	104	96.9	78.9-122			7.44	20
Chlorodibromomethane	0.0250	0.0272	0.0253	109	101	76.4-126			7.20	20
Chloroethane	0.0250	0.0277	0.0261	111	104	47.2-147			6.20	20
2-Chloroethyl vinyl ether	0.125	0.231	0.218	185	174	16.7-162	J4	J4	5.67	23.7
Chloroform	0.0250	0.0273	0.0259	109	103	73.3-122			5.39	20
Chloromethane	0.0250	0.0243	0.0233	97.3	93.2	53.1-135			4.38	20
2-Chlorotoluene	0.0250	0.0269	0.0249	108	99.6	74.6-127			7.70	20
4-Chlorotoluene	0.0250	0.0265	0.0250	106	100	79.5-123			5.68	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0256	0.0239	102	95.6	64.9-131			6.86	20
1,2-Dibromoethane	0.0250	0.0265	0.0250	106	99.9	78.7-123			6.03	20
Dibromomethane	0.0250	0.0284	0.0271	114	108	78.5-117			4.68	20
1,2-Dichlorobenzene	0.0250	0.0266	0.0250	106	99.9	83.6-119			6.10	20
1,3-Dichlorobenzene	0.0250	0.0267	0.0244	107	97.8	75.9-129			8.82	20
1,4-Dichlorobenzene	0.0250	0.0260	0.0247	104	98.8	81.0-115			5.31	20
Dichlorodifluoromethane	0.0250	0.0238	0.0229	95.1	91.7	50.9-139			3.64	20
1,1-Dichloroethane	0.0250	0.0281	0.0266	113	106	71.7-125			5.75	20
1,2-Dichloroethane	0.0250	0.0285	0.0271	114	108	67.2-121			5.12	20
1,1-Dichloroethene	0.0250	0.0280	0.0266	112	106	60.6-133			5.09	20
cis-1,2-Dichloroethene	0.0250	0.0274	0.0257	109	103	76.1-121			6.18	20
trans-1,2-Dichloroethene	0.0250	0.0274	0.0259	109	104	70.7-124			5.51	20
1,2-Dichloropropane	0.0250	0.0286	0.0273	114	109	76.9-123			4.84	20
1,1-Dichloropropene	0.0250	0.0285	0.0269	114	107	71.2-126			5.82	20
1,3-Dichloropropane	0.0250	0.0268	0.0253	107	101	80.3-114			5.83	20
cis-1,3-Dichloropropene	0.0250	0.0288	0.0276	115	110	77.3-123			4.41	20
trans-1,3-Dichloropropene	0.0250	0.0268	0.0255	107	102	73.0-127			5.06	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/20/15 03:32 • (LCSD) 11/20/15 03:51

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
2,2-Dichloropropane	0.0250	0.0283	0.0261	113	105	61.9-132			7.84	20
Di-isopropyl ether	0.0250	0.0288	0.0271	115	108	67.2-131			6.12	20
Ethylbenzene	0.0250	0.0248	0.0230	99.1	92.0	78.6-124			7.46	20
Hexachloro-1,3-butadiene	0.0250	0.0262	0.0242	105	96.8	69.2-136			8.10	20
Isopropylbenzene	0.0250	0.0268	0.0250	107	100	79.4-126			7.00	20
p-Isopropyltoluene	0.0250	0.0288	0.0261	115	105	75.4-132			9.56	20
2-Butanone (MEK)	0.125	0.130	0.128	104	103	44.5-154			1.42	21.3
Methylene Chloride	0.0250	0.0249	0.0237	99.6	94.8	68.2-119			4.90	20
4-Methyl-2-pentanone (MIBK)	0.125	0.151	0.142	121	114	61.1-138			5.87	20
Methyl tert-butyl ether	0.0250	0.0285	0.0268	114	107	70.2-122			5.89	20
Naphthalene	0.0250	0.0247	0.0230	98.9	92.2	69.9-132			7.02	20
n-Propylbenzene	0.0250	0.0252	0.0239	101	95.4	80.2-124			5.50	20
Styrene	0.0250	0.0273	0.0253	109	101	79.4-124			7.49	20
1,1,1,2-Tetrachloroethane	0.0250	0.0266	0.0250	106	99.8	76.7-127			6.32	20
1,1,2,2-Tetrachloroethane	0.0250	0.0269	0.0256	108	103	78.8-124			4.73	20
Tetrachloroethene	0.0250	0.0256	0.0243	102	97.3	71.1-133			5.03	20
Toluene	0.0250	0.0265	0.0250	106	100	76.7-116			5.65	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0273	0.0239	109	95.7	62.6-138			13.0	20
1,2,3-Trichlorobenzene	0.0250	0.0249	0.0225	99.7	89.9	72.5-137			10.4	20
1,2,4-Trichlorobenzene	0.0250	0.0264	0.0241	105	96.3	74.0-137			9.02	20
1,1,1-Trichloroethane	0.0250	0.0282	0.0264	113	105	69.9-127			6.71	20
1,1,2-Trichloroethane	0.0250	0.0266	0.0250	106	100	81.9-119			6.00	20
Trichloroethene	0.0250	0.0272	0.0258	109	103	77.2-122			5.45	20
Trichlorofluoromethane	0.0250	0.0272	0.0255	109	102	51.5-151			6.52	20
1,2,3-Trichloropropane	0.0250	0.0267	0.0254	107	102	74.0-124			4.92	20
1,2,3-Trimethylbenzene	0.0250	0.0263	0.0251	105	100	79.4-118			4.80	20
1,2,4-Trimethylbenzene	0.0250	0.0247	0.0229	98.9	91.4	77.1-124			7.81	20
1,3,5-Trimethylbenzene	0.0250	0.0268	0.0249	107	99.5	79.0-125			7.50	20
Vinyl chloride	0.0250	0.0275	0.0260	110	104	58.4-134			5.50	20
Xylenes, Total	0.0750	0.0804	0.0745	107	99.3	78.1-123			7.62	20
(S) Toluene-d8				*102*	*103*	*88.7-115*				
(S) Dibromofluoromethane				*101*	*101*	*76.3-123*				
(S) 4-Bromofluorobenzene				*98.9*	*98.3*	*69.7-129*				

L801435-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/20/15 07:20 • (MS) 11/20/15 06:22 • (MSD) 11/20/15 06:41

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	ND	0.0152	0.0413	12.2	33.0	1	10.0-130		J3	92.3	31.5
Acrylonitrile	0.125	ND	0.0287	0.0498	23.0	39.8	1	39.3-152	J6	J3	53.6	27.2
Benzene	0.0250	0.00130	0.00202	0.00443	2.88	12.6	1	47.8-131	J6	J3 J6	75.0	22.8
Bromobenzene	0.0250	ND	0.000640	0.00170	2.56	6.81	1	40.0-130	J6	J3 J6	90.7	27.4
Bromodichloromethane	0.0250	ND	0.00187	0.00449	7.48	18.0	1	50.6-128	J6	J3 J6	82.4	22.8
Bromoform	0.0250	ND	0.00109	0.00276	4.36	11.0	1	43.3-139	J6	J3 J6	86.6	25.9
Bromomethane	0.0250	ND	0.00264	0.00513	10.6	20.5	1	5.00-189		J3	64.0	26.7
n-Butylbenzene	0.0250	ND	0.000	0.000778	0.000	3.11	1	23.6-146	J6	J3 J6	200	39.2
sec-Butylbenzene	0.0250	ND	0.000	0.000761	0.000	3.05	1	31.0-142	J6	J3 J6	200	34.7
tert-Butylbenzene	0.0250	ND	0.000	0.000803	0.000	3.21	1	36.9-142	J6	J3 J6	200	31.7
Carbon tetrachloride	0.0250	ND	0.00127	0.00335	5.08	13.4	1	46.0-140	J6	J3 J6	90.1	27.2
Chlorobenzene	0.0250	ND	0.00101	0.00240	4.03	9.60	1	44.1-134	J6	J3 J6	81.7	25.7
Chlorodibromomethane	0.0250	ND	0.00148	0.00343	5.93	13.7	1	49.7-134	J6	J3 J6	79.2	24
Chloroethane	0.0250	ND	0.00252	0.00537	10.1	21.5	1	5.00-164		J3	72.3	28.4
2-Chloroethyl vinyl ether	0.125	ND	0.0141	0.0312	11.2	25.0	1	5.00-159		J3	75.8	40
Chloroform	0.0250	ND	0.00296	0.00590	11.8	23.6	1	51.2-133	J6	J3 J6	66.3	22.8
Chloromethane	0.0250	ND	0.00330	0.00577	13.2	23.1	1	31.4-141	J6	J3 J6	54.5	24.6
2-Chlorotoluene	0.0250	ND	0.000	0.00104	0.000	4.16	1	36.1-137	J6	J3 J6	200	28.9
4-Chlorotoluene	0.0250	ND	0.000336	0.00111	1.34	4.43	1	35.4-137	J6	J3 J6	107	29.8
1,2-Dibromo-3-Chloropropane	0.0250	ND	0.000706	0.00202	2.82	8.08	1	40.4-138	J6	J3 J6	96.4	30.8
1,2-Dibromoethane	0.0250	ND	0.00165	0.00406	6.61	16.2	1	50.2-133	J6	J3 J6	84.2	23.6
Dibromomethane	0.0250	ND	0.00232	0.00509	9.26	20.4	1	52.4-128	J6	J3 J6	74.9	23
1,2-Dichlorobenzene	0.0250	ND	0.000	0.000887	0.000	3.55	1	34.6-139	J6	J3 J6	200	29.9
1,3-Dichlorobenzene	0.0250	ND	0.000	0.000870	0.000	3.48	1	28.4-142	J6	J3 J6	200	31.2
1,4-Dichlorobenzene	0.0250	ND	0.000	0.000980	0.000	3.92	1	35.0-133	J6	J3 J6	200	31.1
Dichlorodifluoromethane	0.0250	ND	0.00167	0.00467	6.69	18.7	1	31.2-144	J6	J3 J6	94.5	30.2
1,1-Dichloroethane	0.0250	ND	0.00248	0.00529	9.93	21.2	1	49.1-136	J6	J3 J6	72.3	22.9
1,2-Dichloroethane	0.0250	ND	0.00234	0.00524	9.34	21.0	1	47.1-129	J6	J3 J6	76.7	22.7
1,1-Dichloroethene	0.0250	ND	0.00217	0.00475	8.69	19.0	1	36.1-142	J6	J3 J6	74.4	25.6
cis-1,2-Dichloroethene	0.0250	ND	0.00228	0.00482	9.11	19.3	1	50.6-133	J6	J3 J6	71.6	23
trans-1,2-Dichloroethene	0.0250	ND	0.00232	0.00477	9.27	19.1	1	43.8-135	J6	J3 J6	69.3	24.8
1,2-Dichloropropane	0.0250	ND	0.00241	0.00509	9.63	20.4	1	50.3-134	J6	J3 J6	71.6	22.7
1,1-Dichloropropene	0.0250	ND	0.00148	0.00355	5.90	14.2	1	43.0-137	J6	J3 J6	82.4	26.4
1,3-Dichloropropane	0.0250	ND	0.00173	0.00413	6.92	16.5	1	51.4-127	J6	J3 J6	81.8	23.1
cis-1,3-Dichloropropene	0.0250	ND	0.00174	0.00413	6.96	16.5	1	48.4-134	J6	J3 J6	81.6	23.6
trans-1,3-Dichloropropene	0.0250	ND	0.00232	0.00432	9.29	17.3	1	46.6-135	J6	J3 J6	60.1	25.3

L801435-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/20/15 07:20 • (MS) 11/20/15 06:22 • (MSD) 11/20/15 06:41

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
2,2-Dichloropropane	0.0250	ND	0.00168	0.00521	6.74	20.8	1	45.2-141	J6	J3 J6	102	26.6
Di-isopropyl ether	0.0250	ND	0.00154	0.00429	6.17	17.2	1	46.7-140	J6	J3 J6	94.3	23.5
Ethylbenzene	0.0250	0.000784	0.000634	0.00178	0.000	3.98	1	44.8-135	J6	J3 J6	95.0	26.9
Hexachloro-1,3-butadiene	0.0250	ND	0.000	0.000469	0.000	1.87	1	10.0-149	J6	J3 J6	200	40
Isopropylbenzene	0.0250	ND	0.000	0.00105	0.000	4.21	1	41.9-139	J6	J3 J6	200	29.3
p-Isopropyltoluene	0.0250	ND	0.000	0.000612	0.000	2.45	1	27.3-146	J6	J3 J6	200	35.1
2-Butanone (MEK)	0.125	ND	0.0358	0.0616	28.6	49.3	1	23.9-170		J3	53.0	28.3
Methylene Chloride	0.0250	ND	0.00333	0.00605	13.3	24.2	1	46.7-125	J6	J3 J6	58.0	22.2
4-Methyl-2-pentanone (MIBK)	0.125	ND	0.0138	0.0299	11.0	23.9	1	42.4-146	J6	J3 J6	73.8	26.7
Methyl tert-butyl ether	0.0250	ND	0.00161	0.00437	6.43	17.5	1	50.4-131	J6	J3 J6	92.5	24.8
Naphthalene	0.0250	ND	0.000352	0.000921	1.41	3.68	1	18.4-145	J6	J3 J6	89.5	34
n-Propylbenzene	0.0250	ND	0.000	0.000864	0.000	3.45	1	35.2-139	J6	J3 J6	200	31.9
Styrene	0.0250	ND	0.000664	0.00159	2.66	6.36	1	39.7-137	J6	J3 J6	82.2	28.2
1,1,1,2-Tetrachloroethane	0.0250	ND	0.00103	0.00277	4.13	11.1	1	48.8-136	J6	J3 J6	91.4	25.5
1,1,2,2-Tetrachloroethane	0.0250	ND	0.00125	0.00329	5.00	13.2	1	45.7-140	J6	J3 J6	89.9	26.4
Tetrachloroethene	0.0250	ND	0.000578	0.00169	2.31	6.76	1	37.7-140	J6	J3 J6	98.1	29.2
Toluene	0.0250	0.00335	0.00147	0.00330	0.000	0.000	1	47.8-127	J6	J3 J6	76.7	24.3
1,1,2-Trichlorotrifluoroethane	0.0250	ND	0.000817	0.00304	3.27	12.1	1	35.7-146	J6	J3 J6	115	28.8
1,2,3-Trichlorobenzene	0.0250	ND	0.000	0.000457	0.000	1.83	1	10.0-150	J6	J3 J6	200	38.5
1,2,4-Trichlorobenzene	0.0250	ND	0.000	0.000602	0.000	2.41	1	10.0-153	J6	J3 J6	200	39.3
1,1,1-Trichloroethane	0.0250	ND	0.00150	0.00401	5.98	16.0	1	49.0-138	J6	J3 J6	91.3	25.3
1,1,2-Trichloroethane	0.0250	ND	0.00436	0.00663	17.4	26.5	1	52.3-132	J6	J3 J6	41.3	23.4
Trichloroethene	0.0250	ND	0.00141	0.00342	5.63	13.7	1	48.0-132	J6	J3 J6	83.4	24.8
Trichlorofluoromethane	0.0250	ND	0.00159	0.00426	6.38	17.0	1	12.8-169	J6	J3	91.1	29.7
1,2,3-Trichloropropane	0.0250	ND	0.00134	0.00340	5.36	13.6	1	44.4-138	J6	J3 J6	86.9	26.3
1,2,3-Trimethylbenzene	0.0250	ND	0.000338	0.00106	1.35	4.23	1	41.0-133	J6	J3 J6	103	27.6
1,2,4-Trimethylbenzene	0.0250	0.000363	0.000304	0.000934	0.000	2.28	1	32.9-139	J6	J3 J6	102	30.6
1,3,5-Trimethylbenzene	0.0250	ND	0.000	0.000866	0.000	3.46	1	37.1-138	J6	J3 J6	200	30.6
Vinyl chloride	0.0250	ND	0.00291	0.00571	11.7	22.8	1	32.0-146	J6	J3 J6	64.9	26.3
Xylenes, Total	0.0750	0.00169	0.00197	0.00533	0.366	4.85	1	42.7-135	J6	J3 J6	92.2	26.6
(S) Toluene-d8					*102*	*101*		*88.7-115*				
(S) Dibromofluoromethane					*101*	*102*		*76.3-123*				
(S) 4-Bromofluorobenzene					*97.6*	*96.3*		*69.7-129*				

Method Blank (MB)

(MB) 11/24/15 11:37

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
1,4-Dioxane	U		0.000597	0.00300
(S) Toluene-d8	*104*			*70.0-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/24/15 10:38 • (LCSD) 11/24/15 10:58

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
1,4-Dioxane	0.0500	0.0429	0.0417	85.9	83.3	70.0-130			3.02	25
(S) Toluene-d8				*103*	*103*	*70.0-130*				

L800774-55 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/24/15 17:21 • (MS) 11/24/15 13:06 • (MSD) 11/24/15 13:26

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
1,4-Dioxane	0.0500	ND	0.0442	0.0556	88.4	111	1	0.000-200			22.9	42
(S) Toluene-d8					*103*	*103*		*70.0-130*				

Method Blank (MB)

(MB) 11/25/15 07:25

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
1,4-Dioxane	U		0.000597	0.00300
(S) Toluene-d8	*103*			*70.0-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/25/15 06:46 • (LCSD) 11/25/15 08:04

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
1,4-Dioxane	0.0500	0.0594	0.0470	119	94.0	70.0-130			23.4	25
(S) Toluene-d8				*103*	*103*	*70.0-130*				

L802294-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/25/15 09:42 • (MS) 11/25/15 08:43 • (MSD) 11/25/15 09:03

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
1,4-Dioxane	0.0500	ND	0.0433	0.0472	86.7	94.4	1	0.000-200			8.56	42
(S) Toluene-d8					*103*	*103*		*70.0-130*				

Method Blank (MB)

(MB) 11/25/15 17:02

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
1,4-Dioxane	U		0.000372	0.00200
(S) Toluene-d8	*103*			*70.0-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 11/25/15 16:03 • (LCSD) 11/25/15 16:22

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
1,4-Dioxane	0.0500	0.0418	0.0456	83.6	91.3	70.0-130			8.82	25
(S) Toluene-d8				*103*	*104*	*70.0-130*				

L800774-66 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 11/25/15 19:19 • (MS) 11/25/15 20:57 • (MSD) 11/25/15 21:17

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
1,4-Dioxane	0.0500	ND	0.195	0.207	77.8	82.6	5	0.000-200			5.99	25
(S) Toluene-d8					*104*	*103*		*70.0-130*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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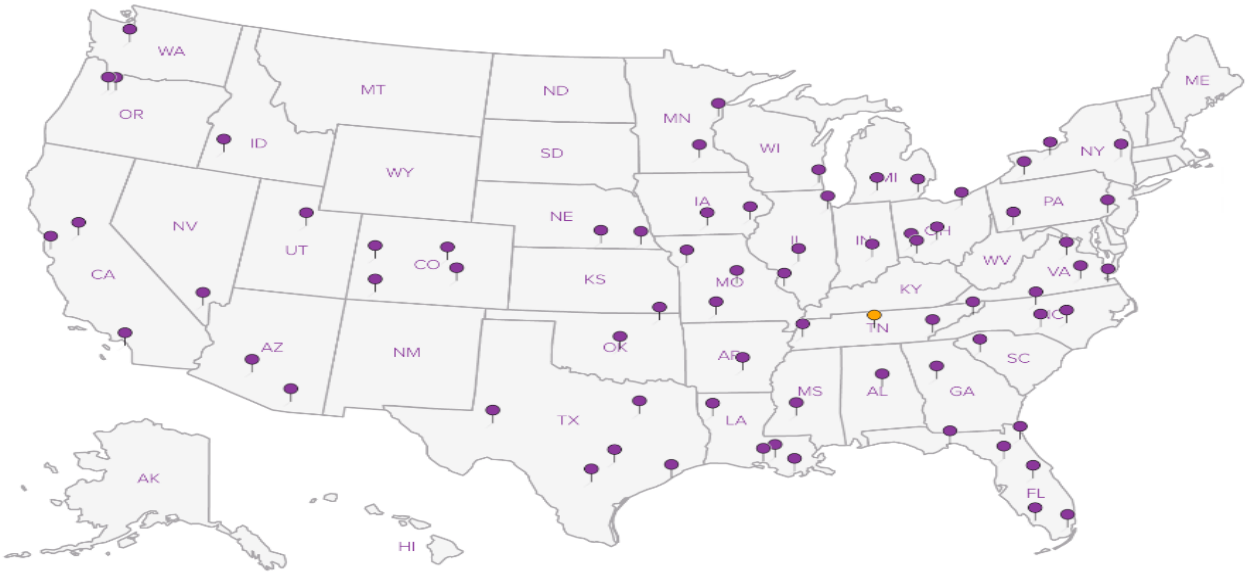
Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



Company Name/Address:
Terracon
640 E. Wilmington Ave.
Salt Lake City, UT
84106

Billing Information:
TERRDUT

Report to:
Wynn John

Email To:
wynn.john@terracon.com

Project Description: Schovaers Electronics

City/State Collected: Salt Lake City, UT

Phone: (801) 466-2223
Fax:

Client Project #
AL127481- 4B

Lab Project #

Collected by (print):
Wynn John, David Jamisc

Site/Facility ID #

P.O. #

Collected by (signature):
W.W.John
Immediately
Packed on Ice N ____ Y ✔

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed
5 Day TAT (Terracon)
Email? ___No ✔Yes
FAX? ✔No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 6

ESC LABORATORIES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 800774
B127

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	VOCs (8260)	13 PP Metals Soils (6010B,/3060A/7199,/7471)	13 PP Metals Water (6010B,/6020B/6020/7199/7470	Hexavalent Chromium in Soil	Hexavalent Chromium in Water	pH in Soil					Rem./Contaminant	Sample # (lab only)
SE-SB-01	Grab	GW		11/11/15	11:22	4	X		X		X							01
SE-SB-01@1-2'	Grab	SS	1-2	11/11/15	10:41	2		X		X		X						02
SE-SB-01@10-10.5'	Grab	SS	10-10.5	11/11/15	10:52	1	X											03
SE-SB-02	Grab	GW		11/11/15	10:20	4	X		X		X							04
SE-SB-02@1-2'	Grab	SS	1-2	11/11/15	10:05	2		X		X		X						05
SE-SB-02@10-10.5'	Grab	SS	10-10.5	11/11/15	10:16	1	X											06
SE-SB-03	Grab	GW		11/11/15	12:38	4	X		X		X							07
SE-SB-03@1.5-2'	Grab	SS	1.5-2	11/11/15	12:19	2		X		X		X						08
SE-SB-03@10-10.5	Grab	SS	10-10.5	11/11/15	12:29	1	X											09
--	Grab		--	--	--													

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Remarks: **Water sample analyzed for 13 pp metals was field filtered and preserved with nitric acid.**

Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
W.W.John	11/12/15	15:34	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.4 °C Bottles Received: 11 9+TB

Date: 11/13/15 Time: 900

Condition: (lab use only) JW7

COC Seal Intact: ___Y ___N ___NA

pH Checked: C2 NCF: X

Company Name/Address:
Terracon
640 E. Wilmington Ave.
Salt Lake City, UT
84106

Billing Information:
TERRDUT

Report to:
Wynn John

Email To:
wynn.john@terracon.com

Project Description: Schovaers Electronics

City/State Collected: Salt Lake City, UT

Phone: (801) 466-2223
Fax:

Client Project #
AL127481- 4B

Lab Project #

Collected by (print):
Wynn John, David Jamisc

Site/Facility ID #

P.O. #

Collected by (signature):
W. W. John

Immediately Packed on Ice N ____ Y ✔

Rush? (Lab MUST Be Notified)
____ Same Day 200%
____ Next Day 100%
____ Two Day 50%
____ Three Day 25%

Date Results Needed
5 Day TAT (Terracon)

Email? ___No ✔Yes
FAX? ✔No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	VOCs (8260)	13 PP Metals Soils (6010B,/3060A/7199,/7471)	13 PP Metals Water (6010B,/6020B/6020/7199/7470	Hexavalent Chromium in Soil	Hexavalent Chromium in Water	pH in Soil					Rem./Contaminant	Sample # (lab only)
SE-SB-04	Grab	GW		11/11/15	14:46	4	X		X		X							10
SE-SB-04@1-2'	Grab	SS	1-2	11/11/15	14:31	2		X		X		X						11
SE-SB-04@10-10.5'	Grab	SS	10-10.5	11/11/15	14:41	1	X											12
SE-SB-05	Grab	GW		11/11/15	14:18	4	X		X		X							13
SE-SB-05@5-6.5	Grab	SS	5-6.5	11/11/15	13:50	2		X		X		X						14
SE-SB-05@10-11.5'	Grab	SS	10-11.5	11/11/15	13:55	1	X											15
SE-SB-06	Grab	GW		11/11/15	15:29	4	X		X		X							16
SE-SB-06@5-5.5'	Grab	SS	5-5.5	11/11/15	15:14	2		X		X		X						17
SE-SB-06@12.5-13'	Grab	SS	12.5-13	11/11/15	15:19	1	X											18
--	Grab		--	--	--													

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other_____

pH _____ Temp _____

Remarks: **Water sample analyzed for 13 pp metals was field filtered and preserved with nitric acid.**

Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
W. W. John	11/12/15	15:34	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.4 °C Bottles Received: 11 9 +TB

Date: 11/13/15 Time: 900

Condition: (lab use only) JW7

COC Seal Intact: ____ Y ____ N ____ NA

pH Checked: <2 NCF: X

Chain of Custody Page 2 of 6

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 800 774

Table #

Acctnum:

Template:

Prelogin:

TSR:

PB:

Shipped Via:

Company Name/Address:
Terracon
640 E. Wilmington Ave.
Salt Lake City, UT
84106

Billing Information:
TERRDUT

Report to: **Wynn John**

Email To: **wynn.john@terracon.com**

Project Description: **Schovaers Electronics**

City/State Collected: **Salt Lake City, UT**

Phone: **(801) 466-2223**
Fax:

Client Project # **AL127481- 4B**

Lab Project #

Collected by (print): **Wynn John, David Jamisc**

Site/Facility ID #

P.O. #

Collected by (signature): Will John

Immediately Packed on Ice N ____ Y ✔

Rush? (Lab MUST Be Notified)
____ Same Day 200%
____ Next Day 100%
____ Two Day 50%
____ Three Day 25%

Date Results Needed: 5 Day TAT (Terracon)

Email? ___No ✔Yes
FAX? ✔No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	VOCs (8260)	13 PP Metals Soils (6010B,/3060A/7199,/7471)	13 PP Metals Water (6010B,/6020B/6020/7199/7470	Hexavalent Chromium in Soil	Hexavalent Chromium in Water	pH in Soil	Rem./Contaminant	Sample # (lab only)
SE-SB-07	Grab	GW		11/11/15	15:51	4	X		X		X			19
SE-SB-07@1-2'	Grab	SS	1-2	11/11/15	15:59	2		X		X		X		20
SE-SB-07@10-10.5'	Grab	SS	10-10.5	11/11/15	16:12	1	X							21
SE-SB-08	Grab	GW		11/12/15	10:00	4	X		X		X			22
SE-SB-08@0.5-1.5'	Grab	SS	0.5-1.5	11/12/15	9:41	2		X		X		X		23
SE-SB-08@9.5-10.5'	Grab	SS	9.5-10.5	11/12/15	9:45	1	X							24
SE-SB-09	Grab	GW		11/12/15	10:48	4	X		X		X			25
SE-SB-09@1-2'	Grab	SS	1-2	11/12/15	10:37	2		X		X		X		26
SE-SB-09@14-14.5'	Grab	SS	14-14.5	11/12/15	10:46	1	X							27
--	Grab		--	--	--									

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other_____

Remarks: **Water sample analyzed for 13 pp metals was field filtered and preserved with nitric acid.**

pH _____ Temp _____
Flow _____ Other _____

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
W. John	11/12/15	15:34	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____
Temp: 3.4 °C Bottles Received: 11+TB
Date: 11/13/15 Time: 900

Hold #
Condition: (lab use only) JW7
COC Seal Intact: ____Y ____N ____NA
pH Checked: C2 NCF: X

Chain of Custody Page 3 of 6

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # 800774
Table #
Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Company Name/Address:
Terracon
640 E. Wilmington Ave.
Salt Lake City, UT
84106

Billing Information:
TERRDUT

Report to:
Wynn John

Email To:
wynn.john@terracon.com

Project Description: Schovaers Electronics

City/State Collected: Salt Lake City, UT

Phone: (801) 466-2223
Fax:

Client Project #
AL127481- 4B

Lab Project #

Collected by (print):
Wynn John, David Jamisc

Site/Facility ID #

P.O. #

Collected by (signature):
W. Wynn John

Immediately Packed on Ice N ____ Y ✔

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed
5 Day TAT (Terracon)

Email? ___No ✔Yes
FAX? ✔No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	VOCs (8260)	13 PP Metals Soils (6010B,/3060A/7199,/7471)	13 PP Metals Water (6010B,/6020B/6020/7199/7470	Hexavalent Chromium in Soil	Hexavalent Chromium in Water	pH in Soil	Rem./Contaminant	Sample # (lab only)
SE-SB-10	Grab	GW		11/12/15	9:28	4	X		X		X			28
SE-SB-10@0.5-1"	Grab	SS	0.5-1	11/12/15	9:12	2		X		X		X		29
SE-SB-10@8.5-9'	Grab	SS	8.5-9	11/12/15	9:17	1	X							30
SE-SB-11	Grab	GW		11/12/15	10:30	4	X		X		X			31
SE-SB-11@1-1.5'	Grab	SS	1-1.5	11/12/15	10:12	2		X		X		X		32
SE-SB-11@9.5-10'	Grab	SS	9.5-10	11/12/15	10:17	1	X							33
SE-SB-12	Grab	GW		11/12/15	11:12	4	X		X		X			34
SE-SB-12@1-1.5'	Grab	SS	1-1.5	11/12/15	11:02	2		X		X		X		35
SE-SB-12@10-10.5'	Grab	SS	10-10.5	11/12/15	11:09	1	X							36
--	Grab		--	--	--									

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks: **Water sample analyzed for 13 pp metals was field filtered and preserved with nitric acid.**

pH _____ Temp _____
Flow _____ Other _____

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
W. Wynn John	11/12/15	15:34	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.4 °C Bottles Received: 119

Date: 11/13/15 Time: 900

Chain of Custody Page 4 of 6

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # 80074
Table #
Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Hold #

Condition: (lab use only) SW7

COC Seal Intact: ____Y ____N ____NA

pH Checked: <2 NCF: X

Company Name/Address:
Terracon
640 E. Wilmington Ave.
Salt Lake City, UT
84106

Billing Information:
TERRDUT

Report to:
Wynn John

Email To:
wynn.john@terracon.com

Project Description: Schovaers Electronics

City/State Collected: Salt Lake City, UT

Phone: (801) 466-2223
Fax:

Client Project #
AL127481- 4B

Lab Project #

Collected by (print):
Wynn John, David Jamisc

Site/Facility ID #

P.O. #

Collected by (signature):
W. Wyfl

Immediately Packed on Ice N ____ Y ✔

Rush? (Lab MUST Be Notified)
____ Same Day 200%
____ Next Day 100%
____ Two Day 50%
____ Three Day 25%

Date Results Needed
5 Day TAT (Terracon)

Email? ___No ✔Yes
FAX? ✔No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 5 of 6

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 300774
Table #
Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	VOCs (8260)	13 PP Metals Soils (6010B,/3060A/7199,/7471)	13 PP Metals Water (6010B,/6020B/6020/7199/7470	Hexavalent Chromium in Soil	Hexavalent Chromium in Water	pH in Soil	Rem./Contaminant	Sample # (lab only)
SE-SB-13	Grab	GW		11/11/15	9:00	4	X		X		X			37 39
SE-SB-13@1-2'	Grab	SS	1-2	11/11/15	8:40	2		X		X		X		38 40
SE-SB-13@10-10.5'	Grab	SS	10-10.5	11/11/15	8:51	1	X							39 41
SE-SB-14	Grab	GW		11/11/15	11:51	4	X		X		X			40 42
SE-SB-14@1-2'	Grab	SS	1-2	11/11/15	11:30	2		X		X		X		41 43
SE-SB-14@10-10.5'	Grab	SS	10-10.5	11/11/15	11:37	1	X							42 44
SE-SB-15	Grab	GW		11/11/15	9:35	4	X		X		X			43 45
SE-SB-15@1-2'	Grab	SS	1-2	11/11/15	9:21	2		X		X		X		44 46
SE-SB-15@10-10.5'	Grab	SS	10-10.5	11/11/15	9:31	1	X							45 47
--	Grab		--	--	--									

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other_____

pH _____ Temp _____

Remarks: **Water sample analyzed for 13 pp metals was field filtered and preserved with nitric acid.**

Flow _____ Other _____

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
W. Wyfl	11/12/15	15:34	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.4 °C Bottles Received: 11 9 NTB

Date: 11/13/15 Time: 900

Condition: (lab use only)

COC Seal Intact: ___Y ___N ___NA

pH Checked: <2 NCF: X

Chain of Custody Page 6 of 6

ESC LAB SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 80074

Company Name/Address:
Terracon
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Project Description: Schovaers Electronics

City/State Collected: Salt Lake City, UT

Phone: (801) 466-2223
Fax:

Client Project #
AL127481- 4B

Lab Project #

Collected by (print):
Wynn John, David Jamisc

Site/Facility ID #

P.O. #

Collected by (signature):
Immediately Packed on Ice N ___ Y ✔

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed
5 Day TAT (Terracon)

Email? ___No ✔Yes
FAX? ✔No ___Yes

Table #

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	VOCs (8260)	13 PP Metals Soils (6010B,/3060A/7199,/7471)	13 PP Metals Water (6010B,/6020B/6020/7199/7470	Hexavalent Chromium in Soil	Hexavalent Chromium in Water	pH in Soil	Rem./Contaminant	Sample # (lab only)
SE-SB-100	Grab	GW		11/11/15	14:29	4	X		X		X			46 48
SE-SB-100@5-6.5'	Grab	SS	5-6.5	11/11/15	14:29	2		X		X		X		47 49
SE-SB-100@10-11.5'	Grab	SS	10-11.5	11/11/15	14:29	1	X							48 50
SE-SB-101	Grab	GW		11/12/15	10:05	4	X		X		X			45 51
SE-SB-101@0.5-1.5'	Grab	SS	0.5-1.5	11/12/15	10:05	2		X		X		X		50 52
SE-SB-101@9.5-10.5'	Grab	SS	9.5-10.5	11/12/15	10:05	1	X							51 53
Trip Blank	Grab	GW		--	--	1	X							52 54
	Grab	SS												
	Grab	SS												
	Grab													

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other_____

pH _____ Temp _____
Flow _____ Other _____

Remarks: **Water sample analyzed for 13 pp metals was field filtered and preserved with nitric acid.**

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
W. Wynn John	11/12/15	15:34	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.4 °C Bottles Received: 11 9FTB

Date: 11/13/15 Time: 900

Condition: (lab use only) JW

COC Seal Intact: ___Y ___N ___NA

pH Checked: CZ NCF: X

Matt Shacklock

ESC Lab Sciences
Non-Conformance Form

Login #L800774	Client: TERRDUT	Date:11/13/15	Evaluated by:Ryan

Non-Conformance (check applicable items)

	Sample Integrity		Chain of Custody Clarification		
	Parameter(s) past holding time	x	Login Clarification Needed		**If Broken Container:**
	Improper temperature		Chain of custody is incomplete		Insufficient packing material around container
	Improper container type		Please specify Metals requested.		Insufficient packing material inside cooler
	Improper preservation		Please specify TCLP requested.		Improper handling by carrier (FedEx / UPS / Courier
	Insufficient sample volume.		Received additional samples not listed on coc.		Sample was frozen
	Sample is biphasic.		Sample ids on containers do not match ids on coc		Container lid not intact
	Vials received with headspace.		Trip Blank not received.		**If no Chain of Custody:**
	Broken container		Client did not "X" analysis.		Received by:
	Broken container:		Chain of Custody is missing		Date/Time:
	Sufficient sample remains				Temp./Cont. Rec./pH:
					Carrier:
					Tracking#

Login Comments: for SE-SB07 times are swapped. They water time is the last soils time, first soil is waters time, last soil is the first soils time. Logged based offthe times on the COC

Client informed by:		Call		Email		Voice Mail		Date:	Time:
TSR Initials:	Client Contact:								

Login Instructions:

Go by CoC

APPENDIX E
Building Materials Survey
(Asbestos and Hazardous Materials Survey Report)

ASBESTOS AND HAZARDOUS MATERIALS SURVEY

North Temple Brownfields Assessment
EPA Cooperative Agreement No. 96809601
Hazardous Substance Grant for Redevelopment Agency of Salt Lake City
Schovaers Electronics Facility
22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
January 18, 2016
Terracon Project No. AL127481-4C

Prepared for:
Redevelopment Agency of Salt Lake City
Salt Lake City, Utah

Prepared by:
Terracon Consultants, Inc.
Midvale, Utah

January 18, 2016

Salt Lake City Corporation
Division of Sustainability and the Environment
P.O. Box 145467
Salt Lake City, Utah 84114

Attn: Ms. Debbie Lyons
P: 801-535-7795
E: Debbie.lyons@slcgov.com

Re: **Asbestos and Hazardous Materials Survey**
North Temple Brownfields Assessment
EPA Cooperative Agreement No. 96809601
Hazardous Substance Grant for Redevelopment Agency of Salt Lake City
Schovaers Electronics Facility, 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. AL127481-4C

Dear Ms. Lyons:

The purpose of this report is to present the results of an asbestos and hazardous materials survey performed on October 23, 2015, at the above-referenced building in Salt Lake City, Utah. This survey was conducted in accordance with our Proposal Number PAL150302, dated June 18, 2015.

Friable and Non-friable asbestos-containing materials were detected during the assessment of the building. Please refer to the attached report for details.

Terracon appreciates the opportunity to provide this service to Salt Lake City Corporation and The Redevelopment Agency of Salt Lake City. If you have any questions regarding this report, or if you need assistance with project oversight and sampling during demolition of this building, please contact Michael Dunbar at (801) 545-9062.

Sincerely,

Terracon Consultants, Inc.

Michael Dunbar
Field Project Manager
State of Utah Inspector Certification
No. ASB-5752

J. Rush Bowers, CIH, CSP
Senior Project Industrial Hygienist

State of Utah Company Certification No. 22

Table of Contents

APPENDICES

ASBESTOS AND HAZARDOUS MATERIALS SURVEY
NORTH TEMPLE BROWNFIELDS ASSESMENT
EPA COOPERATIVE AGREEMENT NO. 96809601
HAZARDOUS SUBSTANCE GRANT FOR
REDEVELOPEMNT AGENCY OF SALT LAKE CITY
SCHOVAERS ELECTRONICS FACILITY
22 SOUTH JEREMY STREET, SALT LAKE CITY, UTAH
ACRES ID #199723

Terracon Project No. AL127481-4C
January 18, 2016

1.0 INTRODUCTION

Terracon conducted an asbestos and hazardous materials survey of the Schovaers Electronics building located at 22 Jeremy Street, Salt Lake City, Utah. The survey was conducted on October 23, 2015, by AHERA-accredited and State of Utah-certified asbestos inspectors in accordance with Terracon Proposal No. PAL150302, dated June 18, 2015. Interior and exterior building components were surveyed and homogeneous areas of suspect asbestos-containing materials (ACM) were visually identified and documented. Although reasonable effort was made to survey accessible suspect materials, additional suspect but un-sampled materials could be located in walls, in voids, or in other concealed areas. Suspect ACM samples were collected in accordance with the sampling protocols outlined in Environmental Protection Agency (EPA) regulation 40 CFR 763 Asbestos Hazard Emergency Response Act (AHERA), and the State of Utah, Division of Air Quality (DAQ), Utah Administrative Code R307-801 – Asbestos Rule. Samples were delivered to an accredited laboratory for analysis by Polarized Light Microscopy (PLM).

1.1 Project Objective

The asbestos and universal wastes survey was requested to support planning for future redevelopment in the area. EPA regulation 40 CFR 61, Subpart M, National Emission Standards for Hazardous Air Pollutants (NESHAP), prohibits the release of asbestos fibers to the atmosphere during renovation or demolition activities. The asbestos NESHAP and the State of Utah DAQ require that potentially regulated asbestos-containing materials be identified, classified and quantified prior to planned disturbances or demolition activities.

2.0 BUILDING DESCRIPTION

The building consists of a front office area and a production area. General construction is a slab-on-grade with exterior block walls, wood-framed interior gypsum walls, and a metal-decked asphalt and gravel roof. Interior finishes consist of vinyl floor tiles and mastic, vinyl sheet flooring and mastic, finished and unfinished gypsum wallboard, ceiling tile, and carpets. The east exterior elevation has a stucco finish.

3.0 FIELD ACTIVITIES

The survey was conducted by Mr. John Larson and Mr. Michael Dunbar, AHERA-accredited and State of Utah-certified asbestos inspectors. The inspectors were also registered Pre-demolition Building Inspectors. Universal hazardous wastes were inspected in accordance with the Salt Lake County Health Department's (SLCHD) Solid Waste Management and Permitting Regulation #1. Copies of Mr. Larson's and Mr. Dunbar's asbestos inspector training certificates, State of Utah Inspector Certificates, and the SLCHD Pre-demolition Building Inspector Registrations are provided in Appendix 5. The survey was conducted in accordance with the sample collection protocols established in EPA regulation 40 CFR 763, AHERA. A summary of survey activities is provided below.

3.1 Visual Assessment

Our survey activities began with a visual observation of the structure's interior and exterior to identify homogeneous areas of suspect ACM. A homogeneous area consists of building materials that appear similar throughout in terms of color, texture, and date of application. Interior and exterior assessment was conducted throughout visually accessible areas of the building including the roof.

Building materials identified as concrete, glass, wood, masonry, metal, or rubber were not considered suspect ACM and were not sampled during this survey.

3.2 Physical Assessment

A physical assessment of each homogeneous area of suspect ACM was conducted to assess the friability and condition of the materials. A friable material is defined by the EPA as a material that can be crumbled, pulverized, or reduced to powder by hand pressure when dry. Friability was assessed by physically touching suspect materials.

3.3 Sample Collection

Based on the results of the visual observation, bulk samples of suspect ACM were collected in general accordance with AHERA sampling protocols. Random samples of suspect materials were collected in each homogeneous area. The inspector collected bulk samples using wet methods as applicable to reduce the potential for fiber release. Samples were placed in sealable containers and labeled with unique sample numbers using an indelible marker.

Terracon collected 48 bulk samples from 16 homogeneous areas of suspect ACM. A summary of suspect ACM samples collected during the survey is included as Appendix 1.

3.4 Sample Analysis

Bulk samples were submitted under chain-of-custody to International Asbestos Testing Laboratories of Mt. Laurel, New Jersey, for analysis by polarized light microscopy with dispersion

staining techniques per USEPA method 600/R-93/116. The percentage of asbestos, where applicable, was determined by microscopic visual estimation. International Asbestos Testing Laboratories is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) Accreditation No. 101165-0.

4.0 REGULATORY OVERVIEW

The asbestos NESHAP (40 CFR Part 61, Subpart M) regulates asbestos fiber emissions and asbestos waste disposal practices. It also requires the identification and classification of existing building materials prior to demolition or renovation activity. Under NESHAP, asbestos-containing building materials are classified as either friable, Category I non-friable or Category II non-friable ACM. Friable materials are those that, when dry, may be crumbled, pulverized or reduced to powder by hand pressure. Category I non-friable ACM includes packings, gaskets, resilient floor coverings and asphalt roofing products containing more than 1% asbestos. Category II non-friable ACM are any materials other than Category I materials that contain more than 1% asbestos.

Friable ACM, Category I non-friable ACM that will be subjected to drilling, sanding, grinding, cutting or abrading, and Category II non-friable ACM that is in poor condition and has become friable or that could be crushed or pulverized during anticipated renovation or demolition activities are considered regulated ACM (RACM). In the State of Utah, asbestos activities are regulated by the Utah Department of Environmental Quality (UDEQ), Utah Division of Air Quality (UDAQ) under Administrative Code R307-801 – Asbestos Rule. R307-801 requires that any asbestos-related activities conducted in the State of Utah, where more than three square feet or three linear feet of RACM will be disturbed, be conducted by personnel certified by the UDAQ. RACM must be removed prior to renovation or demolition activities which will disturb the materials. If the amount of RACM exceeds 260 linear feet (lf) of pipe insulation, more than 160 square feet (ft^2) on other building components, or will generate more than one 55-gallon drum of waste, the owner or operator must provide the UDAQ with written notification of planned removal activities at least 10 working days prior to the commencement of asbestos abatement activities. Removal of RACM must be conducted by a State of Utah-certified asbestos abatement contractor. Management Plans developed for the in-place management of asbestos-containing materials in AHERA-regulated facilities must be developed by a UDAQ-certified Management Planner.

The Occupational Safety and Health Administration (OSHA) Asbestos Standard for Construction (29 CFR 1926.1101) regulates workplace exposure to asbestos. The OSHA standard requires that employee exposure to airborne asbestos fibers be maintained below 0.1 asbestos fibers per cubic centimeter of air (0.1 f/cc).The OSHA standard classifies construction and maintenance activities that could disturb ACM, and specifies work practices and precautions that employers must follow when engaging in each class of regulated work. The standard also establishes requirements for handling materials containing less than or equal to 1%. States that administer their own federally-approved state OSHA programs may require additional precautions.

5.0 FINDINGS AND RECOMMENDATIONS

Based on the results of laboratory analysis, the following asbestos-containing material was identified:

- White gypsum board wall system (front office) – 2,207 square feet
- White gypsum board wall system (back production areas) – 9,400 square feet
- Green and white 9”x9” floor tile and associated black mastic– 1,100 square feet
- Blue floral pattern vinyl sheet flooring and black mastic – 82 square feet
- White window pane glazing – 266 linear feet
- Gray corrugated cement panel roofing – 335 square feet
- Black roofing flashing/penetration tar – 330 square feet

Cost estimates to remove the above listed materials are provided in Appendix 7.

6.0 UNIVERSAL, HAZARDOUS AND TOXIC WASTES SURVEY

In compliance with the Salt Lake County Health Department’s Solid Waste Management and Permitting Regulation #1, the Terracon inspector visually inspected the building to identify and quantify the following materials:

- Mercury-containing thermostats
- Mercury-containing fluorescent lights
- PCB-containing ballasts or transformers
- Refrigeration units containing chlorofluorocarbons (CFCs)
- Containers of liquid or hazardous waste
- Vehicle batteries

The hazardous materials survey was conducted by Mr. Larson and Mr. Dunbar on October 23, 2015. The following materials were visually identified, but no samples were collected for analysis.

6.1 Mercury-containing fluorescent lights

Mercury (Hg) is a toxic heavy metal and in its vapor form or liquid metal form may be present in switches and light bulbs. When a mercury device breaks, it releases mercury into the air, which is toxic to the human nervous system and can poison wildlife.

- Approximately 58 4-foot and 32 8-foot fluorescent light tubes were identified in light fixtures throughout the building.

6.2 Polychlorinated Biphenyls (PCB) Materials

Polychlorinated biphenyls, or PCBs, are a class of synthetic chemicals, once widely used by industry. Their physical properties made them ideal as insulating and cooling fluids in electrical equipment, such as transformers, light ballasts, and capacitors. The manufacturing of PCBs was banned in 1977.

- Approximately 60 suspect PCB-containing light ballasts were identified in light fixtures throughout the building.

6.3 Chlorofluorocarbons (CFC) Materials

CFCs are a group of materials that may harm the ozone layer. CFCs were used as refrigerants in various devices, such as refrigerators, air handlers, chillers, or freezers. CFCs must be removed prior to disposal or recycling of appliances by technicians who have been certified in an EPA-approved program. This requirement became effective in 1992.

- 2 refrigerator units were observed: one refrigerator and one HVAC compressor.

6.4 Containers of Liquid or Hazardous Waste

- Numerous containers of miscellaneous liquids (paint, cleaners, etc.) were observed in the building:
    - Numerous containers of chemicals used in the process of manufacturing circuit boards.

To the extent that future redevelopment plans for the area include building demolition, the above-noted materials should be properly disposed or recycled prior to demolition. A summary is provided in Appendix 8.

7.0 GENERAL COMMENTS

This asbestos and hazardous materials survey was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same locale. The results, findings, conclusions and recommendations expressed in this report are based on conditions observed during our survey of the building. The information contained in this report is relevant to the date on which this survey was performed, and should not be relied upon to represent conditions at a later date. This report has been prepared on behalf of and exclusively for use by Redevelopment Agency of Salt Lake City for specific application to their project as discussed. This report is not a bidding document. Contractors or consultants reviewing this report must draw their own conclusions regarding further investigation or remediation deemed necessary. Terracon does not warrant the work of regulatory agencies, laboratories or other third parties supplying information which may have been used in the preparation of this report. No warranty, express or implied, is made.

APPENDIX 1

ASBESTOS SURVEY SAMPLE LOCATION SUMMARY

22 South Jeremy Street
Salt Lake City, Utah

ASBESTOS SURVEY SAMPLE LOCATION SUMMARY

HA No.	Material Description	Sample Number	Sample Location	Lab Results	Material Location	Estimated Quantity
01	White Gypsum Wallboard with Joint Compound and Tape	01-WB1-01	Front Office, Southeast Corner	None Detected - White/Brown Sheetrock	Front office	2,207 Sq. Ft.
01	White Gypsum Wallboard with Joint Compound and Tape	01-WB1-01	Front Office, Southeast Corner	None Detected - White Joint Compound	Front office	2,207 Sq. Ft.
01	White Gypsum Wallboard with Joint Compound and Tape	01-WB1-01	Front Office, Southeast Corner	PC 3.1% Chrysotile - Tan Joint Compound	Front office	2,207 Sq. Ft.
01	White Gypsum Wallboard with Joint Compound and Tape	01-WB1-02	Front Office, Northeast Closet	None Detected - White/Brown Sheetrock	Front office	2,207 Sq. Ft.
01	White Gypsum Wallboard with Joint Compound and Tape	01-WB1-02	Front Office, Northeast Closet	PC 4.8% Chrysotile - Off-White Joint Compound	Front office	2,207 Sq. Ft.
01	White Gypsum Wallboard with Joint Compound and Tape	01-WB1-03	Wall By Printer Station/Door To Production	None Detected - White/Brown Sheetrock;	Front office	2,207 Sq. Ft.
01	White Gypsum Wallboard with Joint Compound and Tape	01-WB1-03	Wall By Printer Station/Door To Production	None Detected - White Joint Compound	Front office	2,207 Sq. Ft.
01	White Gypsum Wallboard with Joint Compound and Tape	01-WB1-03	Wall By Printer Station/Door To Production	PC 4.3% Chrysotile - Tan Joint Compound	Front office	2,207 Sq. Ft.
02	White Gypsum Wallboard with Joint Compound and Tape	02-WB1-04	Production Area Adj. To Corridor To Men's RR	None Detected - White/Brown Sheetrock	Back production areas	9,400 Sq. Ft.
02	White Gypsum Wallboard with Joint Compound and Tape	02-WB1-04	Production Area Adj. To Corridor To Men's RR	None Detected - White Joint Compound	Back production areas	9,400 Sq. Ft.
02	White Gypsum Wallboard with Joint Compound and Tape	02-WB1-05	Film Processing Area NW Corner	None Detected - White/Brown Sheetrock	Back production areas	9,400 Sq. Ft.

HA No.	Material Description	Sample Number	Sample Location	Lab Results	Material Location	Estimated Quantity
02	White Gypsum Wallboard with Joint Compound and Tape	02-WB1-05	Film Processing Area NW Corner	None Detected - White Joint Compound	Back production areas	9,400 Sq. Ft.
02	White Gypsum Wallboard with Joint Compound and Tape	02-WB1-06	Women's Restroom NE Corner	PC 3.5% Chrysotile - Tan Joint Compound	Back production areas	9,400 Sq. Ft.
03	Green/white 9" x 9" Floor Tile and Mastic	03-FT1-07	Front Office, File Room	PC 5.6% Chrysotile - Green Floor Tile	Front office under carpets and front office closets	1,100 Sq. Ft.
03	Green/white 9" x 9" Floor Tile and Mastic	03-FT1-07	Front Office, File Room	PC 3.8% Chrysotile - Black Mastic	Front office under carpets and front office closets	1,100 Sq. Ft.
03	Green/white 9" x 9" Floor Tile and Mastic	03-FT1-08	Front Office, File Room	PC 6.0% Chrysotile - Green Floor Tile	Front office under carpets and front office closets	1,100 Sq. Ft.
03	Green/white 9" x 9" Floor Tile and Mastic	03-FT1-08	Front Office, File Room	PC 3.5% Chrysotile - Black Mastic	Front office under carpets and front office closets	1,100 Sq. Ft.
03	Green/white 9" x 9" Floor Tile and Mastic	03-FT1-09	Front Office, Closet	PC 6.4% Chrysotile - Tan Floor Tile	Front office under carpets and front office closets	1,100 Sq. Ft.
03	Green/white 9" x 9" Floor Tile and Mastic	03-FT1-09	Front Office, Closet	PC 3.5% Chrysotile - Black Mastic	Front office under carpets and front office closets	1,100 Sq. Ft.
04	Yellow Carpet Glue	04-MG7-10	Front Office, SE Corner	None Detected - Tan Mastic	Front office under carpet	750 Sq. Ft.
04	Yellow Carpet Glue	04-MG7-10	Front Office, SE Corner	PC 1.1% Chrysotile - Black Mastic	Front office under carpet	750 Sq. Ft.
04	Yellow Carpet Glue	04-MG7-11	Front Office, NW Corner	None Detected - Tan Mastic	Front office under carpet	750 Sq. Ft.
04	Yellow Carpet Glue	04-MG7-12	W Wall S End Adj. To File Room Door	None Detected - Tan Mastic; Front Office	Front office under carpet	750 Sq. Ft.
05	Brown with white surface 2' X 4' Ceiling Tile	05-CT4-13	Film Processing Room West Side	None Detected - White/Tan Ceiling Tile	Film processing room	692 Sq. Ft.
05	Brown with white surface 2' X 4' Ceiling Tile	05-CT4-14	Film Processing Room East Side	None Detected - White/Tan Ceiling Tile	Film processing room	692 Sq. Ft.
05	Brown with white surface 2' X 4' Ceiling Tile	05-CT4-15	Oven Room Center	None Detected - White/Tan Ceiling Tile	Film processing room	692 Sq. Ft.

HA No.	Material Description	Sample Number	Sample Location	Lab Results	Material Location	Estimated Quantity
06	Gray/red painted gray Stucco	06-MA6-16	Exterior Front Of Building North Corner	None Detected - Grey Cementitious	Exterior front of building	1,440 Sq. Ft.
06	Gray/red painted gray Stucco	06-MA6-17	Exterior Front Of Building Center	None Detected - Red Cementitious	Exterior front of building	1,440 Sq. Ft.
06	Gray/red painted gray Stucco	06-MA6-17	Exterior Front Of Building Center	None Detected - Grey Cementitious	Exterior front of building	1,440 Sq. Ft.
06	Gray/red painted gray Stucco	06-MA6-18	Exterior Front Of Building South Corner	None Detected - Grey Cementitious	Exterior front of building	1,440 Sq. Ft.
07	Blue floral print Sheet Vinyl Flooring/Paper Backing	07-FC1-19	Men's Restroom Northeast Corner	20% Chrysotile - Blue/Off-White Vinyl Sheet Flooring	Restrooms	82 Sq. Ft.
07	Blue floral print Sheet Vinyl Flooring/Paper Backing	07-FC1-19	Men's Restroom Northeast Corner	PC 2.1% Chrysotile - Black Mastic	Restrooms	82 Sq. Ft.
07	Blue floral print Sheet Vinyl Flooring/Paper Backing	07-FC1-20	Men's Restroom By Door Southwest Corner	20% Chrysotile - Blue/Off-White Vinyl Sheet Flooring	Restrooms	82 Sq. Ft.
07	Blue floral print Sheet Vinyl Flooring/Paper Backing	07-FC1-21	Women's Restroom North By Door	20% Chrysotile - Blue/Off-White Vinyl Sheet Flooring	Restrooms	82 Sq. Ft.
08	Brown with white surface 1' X 1' Ceiling Tile	08-CT1-22	Men's Restroom Southeast Corner	None Detected - Yellow Ceiling Tile	Restrooms and front office storage	138 Sq. Ft.
08	Brown with white surface 1' X 1' Ceiling Tile	08-CT1-23	Women's Restroom Southwest Corner	None Detected - Yellow Ceiling Tile	Restrooms and front office storage	138 Sq. Ft.
08	Brown with white surface 1' X 1' Ceiling Tile	08-CT1-24	File Room Northwest Corner	None Detected - Yellow Ceiling Tile	Restrooms and front office storage	138 Sq. Ft.
09	White Window Pane Glazing	09-SC1-25	Furnace Room, N Side	PC 1.1% Chrysotile - Gray Glazing	Throughout building	266 Linear Ft.
09	White Window Pane Glazing	09-SC1-26	Breakroom Area, S Side	PC 1.0% Chrysotile - Gray Glazing	Throughout building	266 Linear Ft.
09	White Window Pane Glazing	09-SC1-27	Plating Room, S Side	PC 1.1% Chrysotile - Gray Glazing	Throughout building	266 Linear Ft.
10	Black shingle with brown pebbles Roofing Composite Shingles	10-RF3-28	Compressor Shed Roof, Southeast Corner	None Detected - Red/Brown Shingle	Compressor shed	58 Sq. Ft.

HA No.	Material Description	Sample Number	Sample Location	Lab Results	Material Location	Estimated Quantity
10	Black shingle with brown pebbles Roofing Composite Shingles	10-RF3-28	Compressor Shed Roof, Southeast Corner	None Detected - Black Tar	Compressor shed	58 Sq. Ft.
10	Black shingle with brown pebbles Roofing Composite Shingles	10-RF3-29	Compressor Shed Roof, North Edge Center	None Detected - Red/Brown Shingle	Compressor shed	58 Sq. Ft.
10	Black shingle with brown pebbles Roofing Composite Shingles	10-RF3-29	Compressor Shed Roof, North Edge Center	None Detected - Black Tar	Compressor shed	58 Sq. Ft.
10	Black shingle with brown pebbles Roofing Composite Shingles	10-RF3-30	Compressor Shed Roof, Northwest Corner	None Detected - Black Shingle	Compressor shed	58 Sq. Ft.
10	Black shingle with brown pebbles Roofing Composite Shingles	10-RF3-30	Compressor Shed Roof, Northwest Corner	None Detected - Black Tar	Compressor shed	58 Sq. Ft.
11	Brown layered expansion joint	11-PM5-31	Production Area, S End By Break Area	None Detected - Dk. Brown Fibrous	Production area floors	107 Unit(s)
11	Brown layered expansion joint	11-PM5-32	Center By Film Processing Entry	None Detected - Dk. Brown Fibrous;	Production area floors	107 Unit(s)
11	Brown layered expansion joint	11-PM5-33	Production Area, N End By Chem Storage	None Detected - Dk. Brown Fibrous	Production area floors	107 Unit(s)
12	White CMU block filler	12-MA5-34	Interior Wall In Furnace Room	None Detected - White/Gray Cementitious	Interior and exterior perimeter walls	11,240 Cu. Ft.
12	White CMU block filler	12-MA5-35	Exterior South Wall West End	None Detected - White/Gray Cementitious	Interior and exterior perimeter walls	11,240 Cu. Ft.
12	White CMU block filler	12-MA5-36	Exterior North Wall West End	None Detected - Gray Paint	Interior and exterior perimeter walls	11,240 Cu. Ft.
13	Black rolled asphalt roofing with brown pebbles	13-RF5-37	Carport Southwest Corner	None Detected - Black Roof Material	Exterior car port	504 Sq. Ft.
13	Black rolled asphalt roofing with brown pebbles	13-RF5-37	Carport Southwest Corner	None Detected - Black Tar Paper	Exterior car port	504 Sq. Ft.

HA No.	Material Description	Sample Number	Sample Location	Lab Results	Material Location	Estimated Quantity
13	Black rolled asphalt roofing with brown pebbles	13-RF5-38	Carport Southeast Corner	None Detected - Brown Shingle	Exterior carport	504 Sq. Ft.
13	Black rolled asphalt roofing with brown pebbles	13-RF5-38	Carport Southeast Corner	None Detected - Black Tar Paper	Exterior carport	504 Sq. Ft.
13	Black rolled asphalt roofing with brown pebbles	13-RF5-39	Carport Northwest Corner	None Detected - Brown Shingle	Exterior carport	504 Sq. Ft.
13	Black rolled asphalt roofing with brown pebbles	13-RF5-39	Carport Northwest Corner	None Detected - Black Tar Paper	Exterior carport	504 Sq. Ft.
14	Gray Cement Panels	14-CP1-40	Receiving Dock Roof East Side	25% Chrysotile - Grey Transite	Receiving dock roof	335 Sq. Ft.
14	Gray Cement Panels	14-CP1-41	Receiving Dock Roof North Side	25% Chrysotile - Grey Transite	Receiving dock roof	335 Sq. Ft.
14	Gray Cement Panels	14-CP1-42	Receiving Dock Roof West Side	25% Chrysotile - Grey Transite	Receiving dock roof	335 Sq. Ft.
15	Black tar and felt Built-Up Roofing	15-RF8-43	Main Roof Deck, NW Area	None Detected - Black Roof Material	Main roof	5,900 Sq. Ft.
15	Black tar and felt Built-Up Roofing	15-RF8-44	Main Roof Deck, SW Area	None Detected - Black Roof Material	Main roof	5,900 Sq. Ft.
15	Black tar and felt Built-Up Roofing	15-RF8-45	Center South, East Parapet	None Detected - Black Roof Material	Main roof	5,900 Sq. Ft.
16	Black Roofing Flashing/Penetration Tar	16-RF4-46	SE Parapet	PC 3.0% Chrysotile - Black Roof Material	Main roof perimeter flashings and penetrations	330 Sq. Ft.
16	Black Roofing Flashing/Penetration Tar	16-RF4-47	NW Exhaust Vent	PC 3.1% Chrysotile - Black Roof Material	Main roof perimeter flashings and penetrations	330 Sq. Ft.
16	Black Roofing Flashing/Penetration Tar	16-RF4-48	NE Exhaust Vent	None Detected - Black Roof Material	Main roof perimeter flashings and penetrations	330 Sq. Ft.

APPENDIX 2

CONFIRMED ASBESTOS-CONTAINING MATERIALS

Schovaers Electronics Facility
22 South Jeremy Street
Salt Lake City, Utah
Confirmed Asbestos Containing Materials

HA No.	Material Description	Material Location	% and Type Asbestos**	NESHAP Classification	Condition	Estimated Quantity*
01	White Gypsum Wallboard with Joint Compound and Tape	Front office	PC% 3.1 Chrysotile; PC% 4.3 Chrysotile; PC% 4.8 Chrysotile	Cat. II Non Friable	Good (No Damage)	2,207 Sq. Ft.
02	White Gypsum Wallboard with Joint Compound and Tape	Back production areas	PC% 3.5 Chrysotile	Cat. II Non Friable	Good (No Damage)	9,400 Sq. Ft.
03	Green/white 9" x 9" Floor Tile and Mastic	Front office under carpets and front office closets	PC% 3.5 Chrysotile; PC% 3.8 Chrysotile; PC% 5.6 Chrysotile; PC% 6.0 Chrysotile; PC% 6.4 Chrysotile	Cat. I Non Friable	Good (No Damage)	1,100 Sq. Ft.
07	Blue floral print Sheet Vinyl Flooring/Paper Backing and black mastic	Restrooms	PC% 2.1 Chrysotile; 20% Chrysotile	RACM Friable	Damaged	82 Sq. Ft.
09	White Window Pane Glazing	Throughout building	PC% 1.0 Chrysotile; PC% 1.1 Chrysotile	Cat. II Non Friable	Good (no damage)	266 Linear Ft.
14	Gray Cement Panels	Receiving dock roof	25% Chrysotile	Cat. II Non Friable	Good (No Damage)	335 Sq. Ft.
16	Black Roofing Flashing/Penetration Tar	Main roof perimeter flashings and penetrations	PC% 3.0 Chrysotile; PC% 3.1 Chrysotile	Cat. I Non Friable	Good (No Damage)	330 Sq. Ft.

***Estimated quantities** are based on a cursory field evaluation, and actual quantities may vary significantly, especially if asbestos-containing materials are present in hidden and/or inaccessible areas not evaluated as part of this survey.
****% & Type Asbestos** = this column contains both the analytical result of the sample with the highest concentration of asbestos detected in the samples that make up the HA and the types of asbestos identified.

The materials listed in this table have been sampled and determined to contain asbestos in concentrations greater than 1%. When disturbed, various federal, state and local regulations may apply. These materials should be monitored for damage over time and repaired as necessary by appropriately trained personnel. Removal may be necessary before renovations and in most cases before a demolition. See Appendix B for a summary of samples collected. See Appendix C for detailed analytical results.

APPENDIX 3

ASBESTOS LABORATORY ANALYTICAL REPORTS

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Terracon Consultants, Inc.
640 East Wilmington Ave
Salt Lake City UT 84106

Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787203 **Description / Location:** White/Brown Sheetrock
Client No.: 01-WB1-01 Front Office, Southeast Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	10	Cellulose	90

Lab No.: 5787203 **Description / Location:** White Joint Compound **Layer No.:** 2
Client No.: 01-WB1-01 Front Office, Southeast Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5787203 **Description / Location:** Tan Joint Compound **Layer No.:** 3
Client No.: 01-WB1-01 Front Office, Southeast Corner

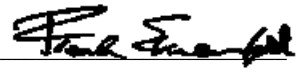
% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 3.1	Chrysotile	None Detected	None Detected	PC 96.9

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: R. McQuiggan

Approved By: 

Date: 11/16/2015

Frank E. Ehrenfeld, III
Laboratory Director

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

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640 East Wilmington Ave
Salt Lake City UT 84106

Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787204 **Description / Location:** White/Brown Sheetrock
Client No.: 01-WB1-02 Front Office, Northeast Closet

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	10	Cellulose	90

Lab No.: 5787204 **Description / Location:** Off-White Joint Compound **Layer No.:** 2
Client No.: 01-WB1-02 Front Office, Northeast Closet

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 4.8	Chrysotile	None Detected	None Detected	PC 95.2

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: R. McQuiggan

Date: 11/16/2015

IATL **International Asbestos Testing Laboratories**

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Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Terracon Consultants, Inc.
640 East Wilmington Ave
Salt Lake City UT 84106

Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787205 **Description / Location:** White/Brown Sheetrock; Front Office,W
Client No.: 01-WB1-03 WallByPrinterStation/DoorToProduction

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	10	Cellulose	90

Lab No.: 5787205 **Description / Location:** White Joint Compound **Layer No.:** 2
Client No.: 01-WB1-03 WallByPrinterStation/DoorToProduction

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5787205 **Description / Location:** Tan Joint Compound **Layer No.:** 3
Client No.: 01-WB1-03 WallByPrinterStation/DoorToProduction

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 4.3	Chrysotile	None Detected	None Detected	PC 95.7

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

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Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787206 **Description / Location:** White/Brown Sheetrock
Client No.: 02-WB1-04 Production Area Adj.ToCorridorToMen'sRR

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	10	Cellulose	90

Lab No.: 5787206 **Description / Location:** White Joint Compound **Layer No.:** 2
Client No.: 02-WB1-04 Production Area Adj.ToCorridorToMen'sRR

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5787207 **Description / Location:** White/Brown Sheetrock
Client No.: 02-WB1-05 Film Processing Area NW Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	10	Cellulose	90

Lab No.: 5787207 **Description / Location:** White Joint Compound **Layer No.:** 2
Client No.: 02-WB1-05 Film Processing Area NW Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

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Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787208 **Description / Location:** Tan Joint Compound
Client No.: 02-WB1-06 Women's Restroom NE Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 3.5	Chrysotile	None Detected	None Detected	PC 96.5

Lab No.: 5787209 **Description / Location:** Green Floor Tile
Client No.: 03-FT1-07 Front Office, File Room

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 5.6	Chrysotile	None Detected	None Detected	PC 94.4

Lab No.: 5787209 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 03-FT1-07 Front Office, File Room

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 3.8	Chrysotile	None Detected	None Detected	PC 96.2

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

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Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787210 **Description / Location:** Green Floor Tile
Client No.: 03-FT1-08 Front Office, File Room

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 6.0	Chrysotile	None Detected	None Detected	94

Lab No.: 5787210 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 03-FT1-08 Front Office, File Room

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 3.5	Chrysotile	None Detected	None Detected	PC 96.5

Lab No.: 5787211 **Description / Location:** Tan Floor Tile
Client No.: 03-FT1-09 Front Office, Closet

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 6.4	Chrysotile	None Detected	None Detected	PC 93.6

Lab No.: 5787211 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 03-FT1-09 Front Office, Closet

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 3.5	Chrysotile	None Detected	None Detected	PC 96.5

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

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Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787212 **Description / Location:** Tan Mastic
Client No.: 04-MG7-10 Front Office, SE Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5787212 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 04-MG7-10 Front Office, SE Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 1.1	Chrysotile	None Detected	None Detected	PC 98.9

Lab No.: 5787213 **Description / Location:** Tan Mastic
Client No.: 04-MG7-11 Front Office, NW Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5787214 **Description / Location:** Tan Mastic; Front Office
Client No.: 04-MG7-12 W Wall,S End Adj. To File Room Door

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

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Report Date: 11/16/2015
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Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787215 **Description / Location:** White/Tan Ceiling Tile
Client No.: 05-CT4-13 Film Processing Room West Side

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	40	Cellulose	50
		10	Fibrous Glass	

Lab No.: 5787216 **Description / Location:** White/Tan Ceiling Tile
Client No.: 05-CT4-14 Film Processing Room East Side

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	40	Cellulose	50
		10	Fibrous Glass	

Lab No.: 5787217 **Description / Location:** White/Tan Ceiling Tile
Client No.: 05-CT4-15 Oven Room Center

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	40	Cellulose	50
		10	Fibrous Glass	

Lab No.: 5787218 **Description / Location:** Grey Cementitious
Client No.: 06-MA6-16 Exterior Front Of Building North Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	2	Fibrous Glass	98

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

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Salt Lake City UT 84106

Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787219 **Description / Location:** Red Cementitious
Client No.: 06-MA6-17 Exterior Front Of Building Center

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5787219 **Description / Location:** Grey Cementitious **Layer No.:** 2
Client No.: 06-MA6-17 Exterior Front Of Building Center

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5787220 **Description / Location:** Grey Cementitious
Client No.: 06-MA6-18 Exterior Front Of Building South Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	2	Fibrous Glass	98

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

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Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787221 **Description / Location:** Blue/Off-White Vinyl Sheet Flooring
Client No.: 07-FC1-19 Men's Restroom Northeast Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
20	Chrysotile	None Detected	None Detected	80

Lab No.: 5787221 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 07-FC1-19 Men's Restroom Northeast Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 2.1	Chrysotile	None Detected	None Detected	PC 97.9

Lab No.: 5787222 **Description / Location:** Blue/Off-White Vinyl Sheet Flooring
Client No.: 07-FC1-20 Men's Restroom By Door Southwest Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
20	Chrysotile	None Detected	None Detected	80

Lab No.: 5787223 **Description / Location:** Blue/Off-White Vinyl Sheet Flooring
Client No.: 07-FC1-21 Women's Restroom North By Door

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
20	Chrysotile	None Detected	None Detected	80

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

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BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787224 **Description / Location:** Yellow Ceiling Tile
Client No.: 08-CT1-22 Men's Restroom Southeast Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	98	Cellulose	2

Lab No.: 5787225 **Description / Location:** Yellow Ceiling Tile
Client No.: 08-CT1-23 Women's Restroom Southwest Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	98	Cellulose	2

Lab No.: 5787226 **Description / Location:** Yellow Ceiling Tile
Client No.: 08-CT1-24 File Room Northwest Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	98	Cellulose	2

Lab No.: 5787227 **Description / Location:** Grey Glazing
Client No.: 09-SC1-25 Furnace Room, N Side

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 1.1	Chrysotile	None Detected	None Detected	PC 98.9

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

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Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787228 **Description / Location:** Grey Glazing
Client No.: 09-SC1-26 Breakroom Area, S Side

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 1.0	Chrysotile	None Detected	None Detected	99

Lab No.: 5787229 **Description / Location:** Grey Glazing
Client No.: 09-SC1-27 Plating Room, S Side

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 1.1	Chrysotile	None Detected	None Detected	PC 98.9

Lab No.: 5787230 **Description / Location:** Red/Brown Shingle
Client No.: 10-RF3-28 Compressor Shed Roof, Southeast Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	15	Fibrous Glass	85

Lab No.: 5787230 **Description / Location:** Black Tar **Layer No.:** 2
Client No.: 10-RF3-28 Compressor Shed Roof, Southeast Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	5	Cellulose	95

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

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Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787231 **Description / Location:** Red/Brown Shingle
Client No.: 10-RF3-29 Compressor Shed Roof, North Edge Center

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	15	Fibrous Glass	85

Lab No.: 5787231 **Description / Location:** Black Tar **Layer No.:** 2
Client No.: 10-RF3-29 Compressor Shed Roof, North Edge Center

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	5	Cellulose	95

Lab No.: 5787232 **Description / Location:** Black Shingle
Client No.: 10-RF3-30 Compressor Shed Roof, Northwest Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	15	Fibrous Glass	85

Lab No.: 5787232 **Description / Location:** Black Tar **Layer No.:** 2
Client No.: 10-RF3-30 Compressor Shed Roof, Northwest Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	5	Cellulose	95

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: R. McQuiggan

Date: 11/16/2015

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Terracon Consultants, Inc.
640 East Wilmington Ave
Salt Lake City UT 84106

Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787233 **Description / Location:** Dk.Brown Fibrous
Client No.: 11-PM5-31 Production Area, S End By Break Area

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	80	Cellulose	20

Lab No.: 5787234 **Description / Location:** Dk.Brown Fibrous; Production Area
Client No.: 11-PM5-32 Center By Film Processing Entry

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	80	Cellulose	20

Lab No.: 5787235 **Description / Location:** Dk.Brown Fibrous
Client No.: 11-PM5-33 Production Area,N End By Chem Storage

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	80	Cellulose	20

Lab No.: 5787236 **Description / Location:** White/Grey Cementitious
Client No.: 12-MA5-34 Interior Wall In Furance Room

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: R. McQuiggan

Date: 11/16/2015

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Terracon Consultants, Inc.
640 East Wilmington Ave
Salt Lake City UT 84106

Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787237 **Description / Location:** White/Grey Cementitious
Client No.: 12-MA5-35 Exterior South Wall West End

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5787238 **Description / Location:** Grey Paint
Client No.: 12-MA5-36 Exterior North Wall West End

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5787239 **Description / Location:** Black Roof Material
Client No.: 13-RF5-37 Carport Southwest Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	10	Fibrous Glass	90

Lab No.: 5787239 **Description / Location:** Black Tar Paper **Layer No.:** 2
Client No.: 13-RF5-37 Carport Southwest Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	90	Cellulose	10

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: R. McQuiggan

Date: 11/16/2015

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Terracon Consultants, Inc.
640 East Wilmington Ave
Salt Lake City UT 84106

Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787240 **Description / Location:** Brown Shingle
Client No.: 13-RF5-38 Carport Southeast Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	10	Fibrous Glass	90

Lab No.: 5787240 **Description / Location:** Black Tar Paper **Layer No.:** 2
Client No.: 13-RF5-38 Carport Southeast Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	90	Cellulose	10

Lab No.: 5787241 **Description / Location:** Brown Shingle
Client No.: 13-RF5-39 Carport Northwest Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	10	Fibrous Glass	90

Lab No.: 5787241 **Description / Location:** Black Tar Paper **Layer No.:** 2
Client No.: 13-RF5-39 Carport Northwest Corner

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	90	Cellulose	10

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: R. McQuiggan

Date: 11/16/2015

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Terracon Consultants, Inc.
640 East Wilmington Ave
Salt Lake City UT 84106

Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787242 **Description / Location:** Grey Transite
Client No.: 14-CP1-40 Receiving Dock Roof East Side

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
25	Chrysotile	None Detected	None Detected	75

Lab No.: 5787243 **Description / Location:** Grey Transite
Client No.: 14-CP1-41 Receiving Dock Roof North Side

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
25	Chrysotile	None Detected	None Detected	75

Lab No.: 5787244 **Description / Location:** Grey Transite
Client No.: 14-CP1-42 Receiving Dock Roof West Side

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
25	Chrysotile	None Detected	None Detected	75

Lab No.: 5787245 **Description / Location:** Black Roof Material
Client No.: 15-RF8-43 Main Roof Deck, NW Area

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	10	Cellulose	85
		5	Fibrous Glass	

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: R. McQuiggan

Date: 11/16/2015

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Terracon Consultants, Inc.
640 East Wilmington Ave
Salt Lake City UT 84106

Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787246 **Description / Location:** Black Roof Material
Client No.: 15-RF8-44 Main Roof Deck, SW Area

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	10	Cellulose	85
		5	Fibrous Glass	

Lab No.: 5787247 **Description / Location:** Black Roof Material
Client No.: 15-RF8-45 Center South, East Parapet

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	20	Cellulose	70
		10	Fibrous Glass	

Lab No.: 5787248 **Description / Location:** Black Roof Material
Client No.: 16-RF4-46 SE Parapet

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 3.0	Chrysotile	None Detected	None Detected	97

Lab No.: 5787249 **Description / Location:** Black Roof Material
Client No.: 16-RF4-47 NW Exhaust Vent

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 3.1	Chrysotile	None Detected	None Detected	PC 96.9

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: R. McQuiggan

Date: 11/16/2015

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Terracon Consultants, Inc.
640 East Wilmington Ave
Salt Lake City UT 84106

Report Date: 11/16/2015
Report No.: 378568
Project: Schovaers Electronics
Project No.: AL127481T4C

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5787250
Client No.: 16-RF4-48

Description / Location: Black Roof Material
NE Exhaust Vent

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	5	Cellulose	95

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: US EPA 600/R-93/116 by Polarized Light Microscopy, (ELAP 198.1 where applicable)

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: R. McQuiggan

Date: 11/16/2015

iATL INTERNATIONAL
ASBESTOS TESTING LABORATORIES

9000 Commerce Parkway, Suite B • Mount Laurel, NJ 08054
Phone: 877-428-4285/856-231-9449 • Fax: 856-231-9818

Chain of Custody

–Bulk Asbestos –

Contact Information

Client Company:	IHI Environmental / Terracon	**Project Number:**	AL127481 THC
Office Address:	640 E. Wilmington Ave.	**Project Name:**	Schovaers Electronics
City, State, Zip:	Salt Lake City, Utah 84106	**Primary Contact:**	John C. Larson
Fax Number:	(801) 466-9616	**Office Phone:**	(801) 746-5448
Email Address:	jclarson@terracon.com	**Cell Phone:**	801-631-6654

PLM Instructions:

- ☒ PLM: Bulk Asbestos Building Materials EPA 600 R-93/116, 1993
- ☐ PLM: Bulk Asbestos Building Materials EPA 600 M-4/82-020, 1982
- ☐ PLM: Bulk Asbestos Building Materials NIOSH 9002, 1985
- ☐ PLM: Bulk Asbestos Building Materials NYSDOH-ELAP 198.1, 2002
- ☐ PLM: Bulk Asbestos Building Materials NYSDOH-ELAP 198.6, 2010
- ☐ TEM: Bulk Asbestos Building Materials NYSDOH-ELAP 198.4, 2009

E-MAILED Nov 11-15

- ☐ PLM: Point Counting
  - ☐ PC: via ELAP 198.1
  - ☐ PC: 400 Points
  - ☐ PC: 800 Points *
  - ☐ PC: 1600 Points *
- ☐ PLM: Instructions for Multi-Layered Samples
  - ☐ Analyze and Report All Separable Layers per EPA 600
  - ☐ Report Composite for Drywall Systems per NESHAP
  - ☐ Report All Layers and Composite Where Applicable
  - ☐ Only Analyze and Report Specifically Noted Layer
- ☐ PLM: Analyze Until Positive (Positive Stop)
  - ☐ AUP: by Homogenous Area as Noted
  - ☐ AUP: by Material Type as Noted
- ☐ PLM: NOB via 198.6
  - ☐ PLM: Friable via EPA 600 2.3
  - ☐ If <1% by PLM, to TEM via 198.4 *
  - ☐ If <1% by PLM, Hold for Instructions
- ☐ PLM: Non-Building Material*,** (Dust, Wipe, Tape)
  - ☐ Soil or Vermiculite Analysis*
  - ☐ CARB 435

Special Instructions: _____

** Additional charge and turnaround may be required* *** Alternative Method (ex: EPA 600/R-04/004) may be recommended by Laboratory*

Turnaround Time

Preliminary Results Requested Date: _____ (Specific date / time) ☐ Verbal ☒ Email ☐ Fax

☐ 10 Day ☒ 5 Day ☐ 3 Day ☐ 2 Day ☐ 1 Day* ☐ 12 Hour** ☐ 6 Hour** ☐ RUSH**

* End of next business day unless otherwise specified. ** Matrix Dependent. ***Please notify the lab before shipping***

Chain of Custody

Relinquished (Name/Organization):	Terracon Jake K	Date:	11/9/15	Time:	5:30
Received (Name / iATL):		Date:		Time:	RECEIVED
Sample Login (Name / iATL):		Date:	//////	Time:	
Analysis(Name(s) / iATL):	RM Williams	Date:		Time:	
QA/QC Review (Name / iATL):		Date:	11-17-15	Time:	NOV 10 2015
Archived / Released: _____	QA/QC InterLAB Use: _____	Date:		Time:	

iATL INTERNATIONAL
ASBESTOS TESTING LABORATORIES

9000 Commerce Parkway, Suite B • Mount Laurel, NJ 08054
Phone: 877-428-4285/856-231-9449 • Fax: 856-231-9818

Sample Log
–Bulk Asbestos –

Client: RDA of SLC Project: Schoolers Electronics

Sampling Date/Time: 10/23 - 11/6/15

Bulk Asbestos Sample Log			
Client Sample #	**iATL #**	**Location/Description**	**Notes**
	See Attached Bulk		
	Sample Log		

Terracon PN AU27481T4C **Asbestos Sample Location Log** Page 1 of 3

Client Name: RDA of SLC

Building Name: Schougers Electronics

Inspector: J. Larson, M. Dunbar

Sample No: (HA, BS Code, Sample No.)	Written location where bulk sample is collected.	Collection Date
01 - WB1 - 01	Front office. South east corner	5787203
01 - WB1 - 02	Front office North East Closet	5787204
01 - WB1 - 03	Front office West wall by printer station / door to Production area	5787205
02 - WB1 - 04	Production area adj to corridor to men's restroom	5787206
02 - WB1 - 05	Film processing area North west corner	5787207
02 - WB1 - 06	Women's restroom North east corner	5787208
03 - FT1 - 07	Front office file room	5787209
03 - FT1 - 08	Front office File room	5787210
03 - FT1 - 09	Front office Closet	5787211
04 - MG7 - 10	Front office South east corner	5787212
04 - MG7 - 11	Front office North west corner	5787213
04 - MG7 - 12	Front office West wall South end adjacent to file room door	5787214
05 - CT4 - 13	Film processing room West side	5787215
05 - CT4 - 14	Film processing room East side.	5787216
05 - CT4 - 15	Oven room Center	5787217
06 - MA6 - 16	Exterior front of building North corner	5787218
06 - MA6 - 17	Exterior front of building Center	5787219
06 - MA6 - 18	Exterior front of building South corner	5787220
- -		

Terracon PN AL127481T4C **Asbestos Sample Location Log** Page 2 of 3

Client Name: RDA
Building Name: Schovers Electronics
Inspector: S. Larson, M. Dunbar

Sample No: (HA, BS Code, Sample No.)	Written location where bulk sample is collected.	Collection Date
07 - FC1 - 19	Men's Restroom North east Corner	5787221 10/23/15
07 - FC1 - 20	Men's restroom by door South west corner	5787222
07 - FC1 - 21	Women's restroom north by door	5787223
08 - CT1 - 22	Men's restroom Southeast Corner	5787224
08 - CT1 - 23	Women's restroom South west corner	5787225
08 - CT1 - 24	file room north west corner	5787226
09 - SC1 - 25	Furnace Rm, N. side	5787227
09 - SC1 - 26	Breakroom Area, S. side	5787228
09 - SC1 - 27	plating Room, S. side	5787229
10 - RF3 - 28	Compressor Shed roof South east corner	5787230
10 - RF3 - 29	Compressor Shed roof North edge center	5787231
10 - RF3 - 30	Compresso Shed roof North west corner	5787232
11 - PM5 - 31	Production area South end by break area	5787233
11 - PM5 - 32	Production area center by film processing entry	5787234
11 - PM5 - 33	Production area North end by chem storage	5787235
12 - MA5 - 34	Interior wall by in Furnace room	5787236
12 - MA5 - 35	Exterior South wall west end	5787237
12 - MA5 - 36	Exterior North wall West end	5787238
- -		

Terracon PN AL127481T4C **Asbestos Sample Location Log** Page 3 of 3

Client Name: RDA
Building Name: Schovaer's Electronics
Inspector: J. Larson, M. Dunbar

Sample No: (HA, BS Code, Sample No.)	Written location where bulk sample is collected.	Collection Date
13 - RF5 - 37	Carport South west corner	5787239 10/23/15
13 - RF5 - 38	Carport South east corner	5787240
13 - RF5 - 39	Carport North west corner	5787241
14 - CP1 - 40	Receiving Dock roof East ~~West~~ side	5787242 11/6/15
14 - CP1 - 41	Receiving Dock roof North side	5787243
14 - CP1 - 42	Receiving Dock roof ~~E~~ West side	5787244
15 - RF8 - 43	MAIN ROOF DECK, NW Area	5787245
15 - RF8 - 44	MAIN ROOF DECK, SW Area	5787246
15 - RF8 - 45	Center South, East parapet	5787247
16 - RF4 - 46	SE parapet	5787248
16 - RF4 - 47	NW Exhaust Vent	5787249
16 - RF4 - 48	NE Exhaust Vent	~~5787250~~
- -		
- -		
- -		
- -		
- -		
- -		

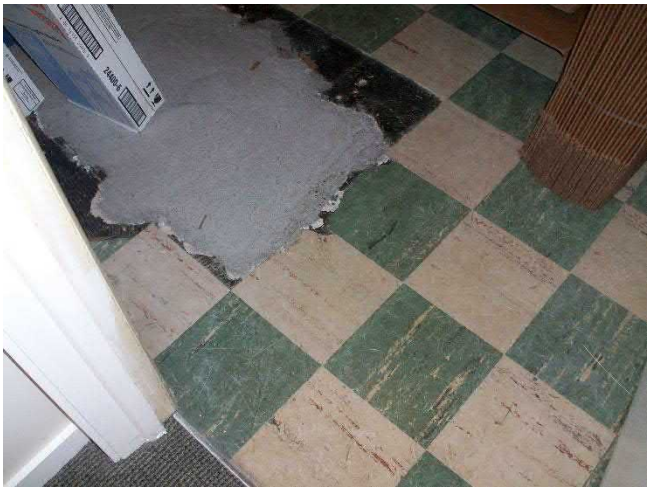
APPENDIX 4

PHOTOGRAPHS

Photograph 1
Front view of property

Photograph 2
HA-01 White gypsum wall system - Asbestos-containing

Photograph 3
HA-02 Unpainted gypsum wall system - Asbestos-containing



Photograph 4
HA-03 Green/white 9”x9” floor tile and black mastic - Asbestos-containing

Photograph 5
HA-05 Brown with white surface 2’x4’ ceiling tile - Not asbestos-containing

Photograph 6
HA-06 Gray and red painted gray stucco - Not asbestos-containing

Photograph 7
HA-07 Blue floral print vinyl sheet flooring and black mastic - Asbestos-containing

Photograph 8
HA-08 Brown with white surface 1'x1' hole punch ceiling tile and brown mastic - Not asbestos-containing

Photograph 9
HA-09 White window glazing - Asbestos-containing

Photograph 10
HA-10 Black asphalt roofing shingle with brown pebbles and brown felt – Not asbestos-containing

Photograph 11
HA-12 White block filler - Not asbestos-containing

Photograph 12
HA-13 Black rolled asphalt roofing with brown pebbles and brown felt - Not asbestos-containing

Photograph 13
HA-14 Gray corrugated cement panel - Asbestos-containing

Photograph 14
HA-15 Black tar and felt built up roof with pea gravel – Not asbestos containing

Photograph 15
HA-16 Black tar sealant - Asbestos-containing

APPENDIX 5

CERTIFICATIONS

State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF AIR QUALITY
Bryce C. Bird
Director

Utah Asbestos Certification

Michael Dunbar
ASB-5752
Inspector (Exp. 10/30/16)
Management Planner (Exp. 10/30/16)

Director, Utah Division of Air Quality

DAQA-001-15

November 5, 2015

Michael Dunbar
Terracon Consultants, Inc.
640 East Wilmington Avenue
Salt Lake City, UT 84106

Mr. Dunbar:

Re: Utah Asbestos Program Individual Certification Card

The Utah Division of Air Quality (DAQ) has reviewed your Utah Asbestos Program Certification Application for Individuals and we are pleased to inform you that your application has been approved. Your new asbestos program individual certification card is enclosed with this letter and this card is the sole method of individual certification documentation that you will receive from the DAQ.

Please check the information on your asbestos program certification card carefully. Please confirm that the photograph, name, and certification discipline(s) are correct. Also, please remember to keep your current asbestos program certification card with you at all times when you are performing regulated asbestos work activities.

If you have any questions regarding this letter or the enclosed asbestos program certification card, please contact Lisa Haroutunian at (801) 536-4007 or at lharoutunian@utah.gov.

Sincerely,

Robert W. Ford, Manager
Air Toxics, Lead-Based Paint, and Asbestos Section

RWF:bt LW

195 North 1950 West, 4th Floor • Salt Lake City, UT
Mailing Address: P.O. Box 144820 • Salt Lake City, UT 84114-4820
Telephone (801) 536-4000 • Fax (801) 536-4099 • T.D.D. (801) 903-3978
www.deq.utah.gov

Salt Lake County Health Department

Registered Predemolition Building Inspector

Name
Michael Dunbar

Reg#: **PBI136**

Height	Weight	Sex	DOB	Eyes
5'8"	150	M	11/17/76	BRO

Signature

Director

ex 6/30/17

Utah Asbestos Certification

John C. Larson
ASB-0894
Inspector (Exp. 10/30/16)

Director, Utah Division of Air Quality

State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF AIR QUALITY
Bryce C. Bird
Director

DAQA-001-15

November 5, 2015

John Larson
Terracon Consultants, Inc.
640 East Wilmington Avenue
Salt Lake City, UT 84106

Mr. Larson:

Re: Utah Asbestos Program Individual Certification Card

The Utah Division of Air Quality (DAQ) has reviewed your Utah Asbestos Program Certification Application for Individuals and we are pleased to inform you that your application has been approved. Your new asbestos program individual certification card is enclosed with this letter and this card is the sole method of individual certification documentation that you will receive from the DAQ.

Please check the information on your asbestos program certification card carefully. Please confirm that the photograph, name, and certification discipline(s) are correct. Also, please remember to keep your current asbestos program certification card with you at all times when you are performing regulated asbestos work activities.

If you have any questions regarding this letter or the enclosed asbestos program certification card, please contact Lisa Haroutunian at (801) 536-4007 or at lharoutunian@utah.gov.

Sincerely,

Robert W. Ford, Manager
Air Toxics, Lead-Based Paint, and Asbestos Section

RWF:bt LW

195 North 1950 West, 4th Floor • Salt Lake City, UT
Mailing Address: P.O. Box 144820 • Salt Lake City, UT 84114-4820
Telephone (801) 536-4000 • Fax (801) 536-4099 • T.D.D. (801) 903-3978
www.deq.utah.gov

UNIVERSITY OF UTAH
SCHOOL OF MEDICINE

Rocky Mountain Center for
Occupational & Environmental Health

Department of Family & Preventive Medicine
391 Chipeta Way, Suite C
Salt Lake City UT 84108
Phone: (801) 581-4055
Fax: (801) 585-5275

THIS CERTIFIES THAT

John C. Larson

HAS COMPLETED THE REQUISITE TRAINING FOR ASBESTOS ACCREDITATION UNDER TSCA TITLE II

ATTENDED AN ANNUAL REFRESHER COURSE IN

PRACTICES AND PROCEDURES IN
ASBESTOS ABATEMENT

Asbestos Inspector Refresher

DATE: October 30, 2015
NUMBER: **150928**
EXPIRES: October 30, 2016
CREDITS: 0.40 CEUs / .67 ABIH CM Points

Connie Crandall

Connie Crandall, MBA, MA
Continuing Education Director

Salt Lake Valley Health Department
Registered Predemolition Building Inspector

Name	Reg#: PBI012
Larson, John C.	
Social Sec # XXX-XX-XXXX	
Height 5' 7" · Weight 165 · Sex M · DOB 07/05/40 · Eyes GRY	
Signature	
Director	exp 2/12

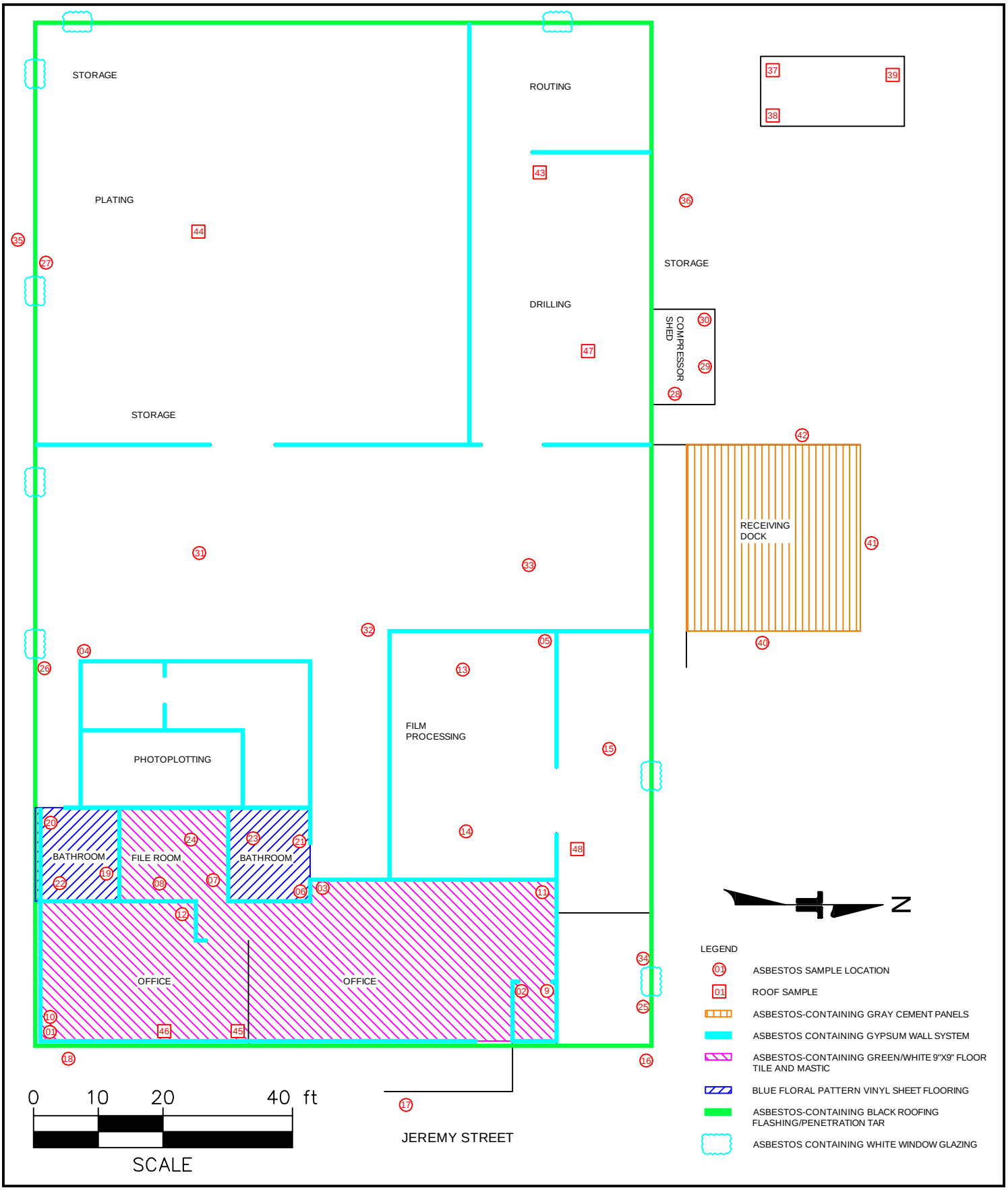
The Director may revoke or suspend this registration based upon violations of any requirements in HealthRegulation #1

SLVHD
Salt Lake Valley Health Department

PDBI# 012
EXPIRES 2/2016

APPENDIX 6

ASBESTOS SAMPLE LOCATION DRAWINGS



Project Mngr: ~	Project No. AL127481	Terracon Consulting Engineers & Scientists	Sample and ACM Locations - Ground Floor
Drawn By: CPD	Scale: AS SHOWN	640 East Wilmington Avenue Salt Lake City, Utah	Pre-Demolition Asbestos and Hazardous Waste Survey
Checked By: MAD	File No. AL127481-4C		22 South Jeremy Street
Approved By:	Date:		Salt Lake City, Utah

EX. No 1

APPENDIX 7

ASBESTOS ABATEMENT COST ESTIMATES

Schovaers Electronics Facility
22 South Jeremy Street
Salt Lake City, Utah
Estimated Abatement Costs – Asbestos

Homogeneous Area Number	Material	Location	Asbestos Content	Recommended Response Actions	Quantity Sq. Ft.	Approximate Abatement Cost
01	White Gypsum Wallboard with Joint Compound and Tape	Front office	PC% 3.1 Chrysotile; PC% 4.3 Chrysotile; PC% 4.8 Chrysotile	2	2,207 Sq. Ft.	$8,828.00
02	White Gypsum Wallboard with Joint Compound and Tape	Back production areas	PC% 3.5 Chrysotile	2	9,400 Sq. Ft.	$37,600.00
03	Green/white 9" x 9" Floor Tile and Mastic	Front office under carpets and front office closets	PC% 3.5 Chrysotile; PC% 3.8 Chrysotile; PC% 5.6 Chrysotile; PC% 6.0 Chrysotile; PC% 6.4 Chrysotile	1	1,100 Sq. Ft.	$5,500.00
07	Blue floral print Sheet Vinyl Flooring/Paper Backing and black mastic	Restrooms	PC% 2.1 Chrysotile; 20% Chrysotile	3	82 Sq. Ft.	$410.00
09	White Window Pane Glazing	Throughout building	PC% 1.0 Chrysotile; PC% 1.1 Chrysotile	2	266 Linear Ft.	$798.00
14	Gray Cement Panels	Receiving dock roof	25% Chrysotile	2	335 Sq. Ft.	$24,140.00
16	Black Roofing Flashing/Penetration Tar	Main roof perimeter flashings and penetrations	PC% 3.0 Chrysotile; PC% 3.1 Chrysotile	1	330 Sq. Ft.	$1,650.00
					Total	$78,926.00

1 = Category I non-friable asbestos-containing material that may be left in place during demolition activities provided that the material is in good condition and the NESHAP regulation is followed.

2 = Category II non-friable asbestos-containing material that may be left in place during demolition activities provided that the material is in good condition and the NESHAP regulation is followed.

3 = Regulated asbestos-containing material (RACM) that must be abated and removed from the building by a licensed asbestos abatement contractor.

4 = Less than one percent (<1%) asbestos-containing material. Does not require removal by EPA or State of Utah Division of Air Quality; however, OSHA worker exposure considerations apply during the work activities that will impact the material.

Note: Should the client request Terracon to write a specification document for the asbestos removal, conduct a bid walk, and manage the abatement, these services can be provided at an additional cost.

***** Price reflects the condition of the material being located underneath leveling compound or non-ACM floor tile and leveling compound

APPENDIX 8

HAZARDOUS MATERIAL SUMMARY
AND
SALT LAKE VALLEY HEALTH DEPARMENT'S
HAZARDOUS MATERIAL DISPOSITION FORM

Schovaers Electronics Facility
22 South Jeremy Street
Salt Lake City, Utah
Hazardous Materials Summary

Material	Location	Quantity	Approximate Removal Cost
4-foot Fluorescent light tubes	Throughout building	58 tubes	$140.00
8-foot Fluorescent light tubes	Throughout building	32 tubes	$154.00
PCB-containing light-fixture ballasts	Within fluorescent light fixtures	60 units	$720.00
CFC-containing refrigeration units	Breakroom and HVAC on roof	2 units	$400.00
Miscellaneous containers of paint, cleaners, gasses, and chemicals related to circuit board manufacturing	Throughout building	TBD	TBD
		Total	**$1,414.00**

Notes: Terracon can provide services to bid for removal of these items to local qualified contractors at an additional cost

SALT LAKE COUNTY HEALTH DEPARTMENT

Environmental Health Division
Water Quality and Hazardous Waste Bureau
788 East Woodoak Lane, #120
Murray, Utah 84107-6379
Ph: (385) 468-3862 / Fax: (385) 468-3863
http://water.slcohealth.org

Pre-demolition Building Inspection Form

Select one:
- ☐ Residential
- ☒ Business

GENERAL INFORMATION

Address of Demolition, Including City:	Inspection Date:
22 South Jeremy Street, Salt Lake City	10/23/15
Property Owner Name and Contact Information: Bob Schovaers 801-521-2668	**Demolition Permit Holder or Contractor Name and Contact Information:**

INSPECTION RESULTS

	Amount	Condition (Select one)
Mercury (Hg) Thermostats		☐ Damaged ☐ Undamaged
Hg Fluorescent Lights	~~164~~ 90	☐ Damaged ☑ Undamaged
PCB Ballasts or Transformers	~~82~~ 60	☐ Damaged ☑ Undamaged
Refrigeration Units Containing CFC's	2	☐ Damaged ☑ Undamaged
Containers of Hazardous or Special Waste, Including Vehicle Batteries:	Numerous chemicals related to circuit board manufacture	☐ Damaged ☒ Undamaged

Suspect ACM (Substrates sampled):	Ceiling tile ☒	Ceiling texture ☐	Drywall ☒
Flooring ☒	Heat tape ☐	Insulation ☐	Roofing ☒
Window caulk ☒	Other: ☐	Other: ☐	None present ☐

Inspector's Name: (Sign) [signature] (Print) Michael Dunbar — Reg. # PBI - 136

FOLLOW-UP INSPECTION RESULTS

Date:	Inspector (Sign):
Have all items identified above been removed? (Select one)	☐ Yes ☐ No

DISPOSITION OF IDENTIFIED ITEMS OR COPIES OF RECEIPTS

	Name of Disposal or Recycling Facility	Date
Hg Thermostats		
Hg Fluorescent Lights		
PCB Ballasts or Transformers		
Refrigeration Units Containing CFC's		
Hazardous or Special Waste; Batteries		
RACM (or other ACM)		

DO NOT WRITE IN THIS SECTION – FOR HEALTH DEPARTMENT USE ONLY

Approved by: Approved on:

JH 10 NOV 2014

2018a Terracon Consultants, Inc., 2018. *Sampling and Analyses Plan, Salt Lake County Brownfields Assessment, EPA Cooperative Agreement No.96835701, Hazardous Substance Grant for Redevelopment Agency of Salt Lake County – Schoavaers Electronics, 22 South Jeremy Street, ACRES ID #199723, Terracon Project No. 61177082.* Dated May 1, 2018.

Sampling and Analyses Plan

Salt Lake County Brownfields Assessment

EPA Cooperative Agreement No. #96835701

HAZARDOUS MATERIALS AND PETROLEUM GRANT FOR SALT LAKE COUNTY

Schovaers Electronics

ACRES ID# 199723

22 South Jeremy Street

Salt Lake City, Salt Lake County, Utah

May 1, 2018

Terracon Project No. 61177082 Task J

Prepared for:

Salt Lake County

Salt Lake City, Utah

Prepared by:

Terracon Consultants, Inc.

Midvale, Utah

SAMPLING AND ANALYSIS PLAN
APPROVAL SHEET (A1)
Salt Lake County Brownfields Assessment
EPA Cooperative Agreement No. 96835701
Schovaers Electronics
22 South Jeremy Street
Salt Lake City, Utah
May 1, 2018

Approved By

Terracon Project Manager

Andy King — Date: 5/1/2018

Signature

Andy King

Printed Name

Terracon Project QA/QC Leader

Craig D. Eatore — Date: 5/1/18

Signature

Craig D. Eatore

Printed Name

Salt Lake County Redevelopment Agency (Grantee) Approval:

Date: 5/1/2018

Signature

Ruedigar Matthes

Printed Name

U.S. EPA Project Manager/QA Officer Approval:

Date: 5/2/18

Signature

Christina Wilson

Printed Name

PAGE NO.

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TABLE 1B EPA VAPOR INTRUSION SCREENING LEVELS (VISL) FOR VOCs IN SUB-SLAB VAPOR
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TABLE 3A SUMMARY OF SOIL BORINGS
TABLE 3B SUMMARY OF SUB-SLAB SOIL GAS SAMPLING

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E.2120 SOIL GAS SAMPLING – SUBSLAB PIN METHOD
Soil Gas Investigation Guidance Document, Version 1, August 7, 2013
Hexavalent Chromium (CR6) Aqueous Sampling Instructions – Methods 218/7199/3500

DISTRIBUTION LIST (A3)

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Brownfields Project Manager
U.S. EPA Region 8
Mail Code: 8EPR-SR
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Denver, CO 80202-1129
(303) 312-6706

Ruedigar Matthes
Salt Lake County Economic Development
2001 South State Street
Salt Lake City, UT 84114-3300
(385) 468-4868

Joseph Katz
Utah Department of Environmental Quality
Division of Environmental Response and Remediation
Project Manager for the McKinnon Properties Brownfields Assessment
195 North 1950 West
Salt Lake City, UT 84114-4840
(801) 536-4100

Andy King
Terracon Consultants, Inc.
6949 South High Tech Drive
Midvale, UT 84047
Phone: (801) 746-5443

Craig Eaton
Terracon Consultants, Inc.
6949 South High Tech Drive
Midvale, UT 84047
(801) 746-5446

CAS/BBB/ARK/BSR

List of Acronyms and Abbreviations

ABCA	Analysis of Brownfield Cleanup Alternatives
bgs	Below grade surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, as Amended
DERR	Division of Environmental Response and Remediation
DL	Laboratory reporting limit a.k.a. practicable quantification limit
DQI	Data Quality Indicators
DQO	Data Quality Objectives
ESC	ESC Laboratories
HASP	Health and Safety Plan
IHI	IHI Environmental
LCS	Laboratory Control Sample
LFB	Laboratory Fortified Blank
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram (or parts per million)
mg/L	milligrams per liter (or parts per million)
µg/kg	micrograms per kilogram (or parts per billion)
µg/L	micrograms per liter (or parts per billion)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NELAP	National Environmental Laboratory Accreditation Program
OSHA	Occupational Safety and Health Act
PARCCS	Precision, accuracy, representativeness, completeness, comparability, and sensitivity
ppb	parts per billion (in µg/kg or µg/L)
ppm	parts per million (in mg/kg or mg/L)
PQL	Practical Quantitation Limit
PR	Percent Recovery
PS	Performance Standard
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RDA	Redevelopment Agency of Salt Lake City
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
TCA	1,1,1-trichloroethane
TOC	Table of Contents
UDEQ	Utah Department of Environmental Quality
US EPA	United States Environmental Protection Agency
VISL	Vapor Intrusion Screening Level

This document is not a stand-alone quality assurance document and relies on the EPA-approved documents referenced, consistent with *EPA Region 8 QA Document Review Crosswalk* instructions.

PROJECT MANAGEMENT (A)

1.1 Project Task/Organization (A4)

Salt Lake County is responsible for overall implementation of the Schovaers Electronics Property Brownfields Assessment Project. Terracon will perform and coordinate site assessment activities. Identification of key personnel involved in the Salt Lake County Brownfields Assessment Grant project is provided in Section A4 of the Quality Assurance Project Plan (QAPP). Pertinent areas of this SAP as they relate to greater detail or reference in the EPA-approved *Community-Wide Quality Assurance Project Plan, Revision 1, Salt Lake County Brownfields Assessments (Terracon, April 25, 2017),* are indicated by QAPP designations in parentheses in section headers.

1.2 Problem Definition/Background (A5)

A Brownfield is a real property, the expansion, redevelopment, or reuse of which may be complicated by the real or potential presence of a hazardous substance, pollutant, or contaminant. Salt Lake County (the Grantee) is a recipient of an EPA community-wide assessment grant to inventory, characterize, assess, and conduct cleanup planning along with public outreach activities for eligible Brownfield sites located within County boundaries.

As part of the previous Salt Lake City North Temple Brownfields Assessment Grant, Terracon conducted a Phase I Environmental Site Assessment (ESA) on the Schovaers Electronics site (Terracon, 2015). In response to the Recognized Environmental Conditions (RECs) identified in the Phase I ESA, a Phase II ESA was performed under the grant by Terracon (Terracon, 2016). Currently a Phase I ESA is being performed by Terracon, and at this time is in a DRAFT format.

Salt Lake County requested that Terracon develop an Analysis of Brownfield Cleanup Alternatives (ABCA) for the site to assist with cleanup planning, under the Salt Lake County Brownfields Assessment Grant. Terracon determined additional data is needed to supplement the results of the initial Phase II ESA that was conducted during the Salt Lake City North Temple Brownfields Assessment Grant, and recommended that a SAP and additional Phase II be conducted to collect the additional information needed to develop an ABCA. This SAP pertains to and sets forth the proposed site assessment (Phase II) rationale, activities and field sampling locations for the Schovaers Electronics site. The SAP provides a discussion of specific site objectives, site description, and details regarding site-specific field sampling, and is designed is to be used in conjunction with the above-referenced QAPP. The QAPP

describes data collection procedures, analytical testing, QA/QC activities, and data evaluation processes to ensure that appropriate levels of data quality are obtained for field sampling, testing, and analytical activities.

1.2.1 Project Background

The site is an approximately 0.34-acre parcel (Parcel ID #15-02-204-007) addressed as 22 South Jeremy Street and owned by Schovaers Electronics. An approximately 6,000-square-foot industrial building occupies the site. An approximately 400-square-foot garage is present on the northwest side of the site. Paved parking areas are located to the east and north of the building. A small weedy area is present on the western boundary area. Schovaers Electronics has closed its business and the site is currently vacant. A previous investigation (Terracon, 2016), established a groundwater gradient across the property as being to the west-southwest. Depth to groundwater was encountered at 9 to 11 feet below ground surface (bgs).

Terracon conducted a Phase I Environmental Site Assessment (ESA) on the site (Terracon 2015). The Phase I ESA was compliant with Brownfields All Appropriate Inquiry and was performed in conformance with the scope and limitations of American Society for Testing and Materials (ASTM) Practice E1527-13 for the parcel located at 22 South Jeremy Street in Salt Lake City, Salt Lake County, Utah. The purpose of the Phase I ESA was to identify RECs in connection with the site, including the building and other improvements located on the site at the time of the reconnaissance. In conducting the current Phase I ESA, Terracon requested Salt Lake County provide any previous reports they are aware of for the site. The following reports were provided to Terracon for review.

- Phase I Environmental Assessments for Schovaers Electronics
  22 South Jeremy Street
  Salt Lake City, Salt Lake County, Utah
  Dated: August 31, 2015
  Prepared by: Terracon Consultants, Inc.
  For: Redevelopment Agency of Salt Lake City

- Phase II Environmental Site Assessment for Schovaers Electronics
  22 South Jeremy Street
  Salt Lake City, Salt Lake County, Utah
  Dated February 8, 2016
  Prepared by: Terracon Consultants, Inc.
  For: Redevelopment Agency of Salt Lake City

According to the Terracon 2015 Phase I ESA, the site was residential from at least 1898 to the mid-1900s. The residences were demolished and the current commercial building was constructed by 1962. The site building was originally occupied by an electrical supply

company and then a wholesale upholstery business before Schovaers occupied the building in 1977. Schovaers utilized the site to manufacture electric circuit boards.

Terracon's 2015 Phase I ESA identified the following on-site REC in connection with the site:

- **Impacts from adjoining properties:** The north adjacent property has documented improper disposal of 1,1,1, trichlororethane (TCA) very near or on the property line. This identified release represents a REC to the subject property.

- **Long-term industrial use:** The site has been an electroplating shop for approximately 38 years. Evidences of releases from these industrial operations were widespread and included leaking and spilling.

Terracon's 2015 Phase I ESA recommended a subsurface investigation to determine if the identified RECs have impacted the soils or groundwater at the site. Terracon conducted a Phase II ESA in 2016 to investigate the identified RECs. The Phase II ESA identified soil impacts from hexavalent chromium concentrations above industrial and/or residential RSLs in shallow soils within the upper 2 feet across the site. The highest concentrations (exceeding the industrial EPA RSL) were reported from samples collected along the western property boundary and at the northeast corner of the site (beneath pavement). Additional soil sampling was recommended to assess the depth and extent of the impact.

Groundwater beneath the site has been impacted by TCE in the western and northwest portion of the site. The highest concentrations of dissolved TCE (above MCLs and/or VISLs) are located west of the building, with the highest concentration adjacent to the building where historical chemical seepage from the Plate Shop reportedly occurred, leaving visible staining on the exterior walls of the building. Dissolved hexavalent chromium is also present in groundwater at concentrations below the MCL but above the Tapwater RSL. The highest concentrations of dissolved hexavalent chromium appear to be highest on the western side of the property. However, both TCE and hexavalent chromium were reported at sample locations along the northern property boundary. These results suggest that an off-site source of both VOCs and metals contamination may be present. To assess the source of TCE along the western part of the property, additional sampling within the confines of the building of both soil and groundwater will be performed to determine if a possible source is from past operations within the building.

Terracon's 2017 Phase I ESA (DRAFT) identified the following on-site RECs in connection with the site:

- Impacts from north-adjoining property: The north-adjoining property has been a plating shop for over 50 years. A Phase II Environmental Site

Assessment, February 8, 2016 and performed by Terracon, identified impacts to soil and groundwater were present at the site attributed to the historical operations on the property. Specifically, the presence of hexavalent chromium was found in soils that exceed the EPA RSLs for industrial use. The property was identified as a REC to the site.

- **Long-term industrial use:** The site has been an electroplating shop for approximately 40 years. Evidences of releases from these industrial operations were widespread and included leaking and spilling. Historical solvent uses, RCRA hazardous waste storage and disposal, wastewater discharge system, and staining are considered part of the long-term industrial use REC at the site.

- **Soil and Groundwater impacts at the site:** Based on Terracon's Phase II ESA, dated February 8, 2016, sampling at the site identified soil impacts of hexavalent chromium concentrations above industrial and/or residential Regional Screening Levels (RSLs) in shallow soils at depths between 1 and 2 feet bgs across the site. Groundwater has been impacted by trichloroethene (TCE) above Maximum Contaminant Levels (MCLs) and/or Vapor Intrusion Screening Levels (VISLs), and hexavalent chromium below MCL and above the tapwater RSL.

Terracon recommended an additional Phase II ESA to assess the vertical and horizontal extent of impacts to soils and groundwater at the site in order to develop remedial strategies and/or management plans for future re-development of the property.

1.2.2 Regulatory Standards and Criteria

The analytical results will be compared to the following regulatory guidance and standards:

- Soil – EPA Regional Screening Levels (RSL) guidance for residential and industrial use scenarios (November 2017);
- Groundwater – EPA RSL guidance for tapwater (November 2017), Utah Ground Water Quality Protection Standards (UGWQPS) (UAC-R317-6-2.1), Federal Maximum Contaminant Levels (MCLs), and EPA Vapor Intrusion Screening Levels (VISLs) (June 2017).
- Vapor – EPA OSWER Vapor Intrusion Assessment, Vapor Intrusion Screening Level (VISL) Calculator Version 3.5, June 2017.

1.3 Project/Task Description (A6)

The proposed Phase II scope of work described in this SAP is intended to gather the necessary data to bridge the gaps identified in the Terracon 2016 Phase II ESA, the Terracon

2017 Phase I ESA, and to aid with providing the information needed to develop an ABCA for the site.

1.3.1 Building Exterior Soll Borings

Two (2) exterior soil borings are proposed to assess the vertical extent of hexavalent chromium in soils. The previous investigation identified hexavalent chromium near the northeast and southwest corners of the property at concentrations that are greater than the EPA RSL for industrial sites. It was recommended that additional soil sampling be conducted in those two areas to assess the vertical extent of hexavalent chromium impacts in the soil column. **Exhibit 2** (**Appendix A**) depicts the proposed location of soil borings.

- Soil sampling will be conducted at two (2) locations on the exterior of the building. Soil samples will be collected at 2.5, 5, 7.5 and 10 feet below grade surface (bgs). Samples at depths of 2.5 and 5 feet will be analyzed and the other two will be put on hold at the lab pending results for the 2.5 and 5 foot samples. If the samples at 2.5 or 5 foot exceed the industrial RSL the two deeper soil samples will be analyzed.

1.3.2 Interior Soil Borings

To assess impacts to soil and groundwater associated with the historic use of solvents and metals within the building confines, it is proposed to advance seven (7) borings inside the building. Previously accessibility within the interior of the building was extremely limited due to the presence of heavy equipment and associated machinery. **Exhibit 3** (**Appendix A**) shows the proposed locations of interior soil borings.

- Conduct soil sampling at seven (7) locations within the interior of the building. Samples will be collected at a depth of 2 to 3 feet bgs and at the capillary fringe or obvious zone exhibiting signs of impacts.
- Collect one groundwater sample from each of the interior borings.

1.3.3 Sub-Slab Vapor Sampling

To assess the potential for vapor intrusion, sub-slab vapor sampling at four (4) locations is proposed. **Exhibit 3** (**Appendix A**) depicts the locations of the proposed sub-slab vapor sampling locations.

- Conduct sub-slab vapor sampling at four (4) locations within the interior of the building. Samples will be collected directly beneath the floor slab through a sub-slab vapor pin.

1.3.4 Project Schedule

The tentative project schedule is provided in the table below. Actual dates may vary depending on subcontractor availability.

Activity	Planned Start	Planned Completion
Soil and groundwater, sub slab vapor sampling	within 2-3 weeks following SAP approval	within 2-3 days following start of sampling
Laboratory analyses	within 1-2 days following sampling completion	within 2 weeks following start of laboratory analyses
Report preparation	within 1 week following receipt of analytical results	within 4 weeks following receipt of analytical results
EPA review of Report	within 1 week of receipt of draft report	within 2 weeks of receipt of draft report
Issue final Report	within 1 week of receipt of EPA comments on draft report	

*No field work will be conducted until formal EPA approval of the SAP is received by the agency and documented.

1.3.5 Field Work and Sample Collection

Field sampling will include advancement of nine soil borings to allow collection of subsurface soil and groundwater samples and four sub-slab vapor pins to allow collection of sub-slab vapor samples. This includes collecting 22 soil samples, seven groundwater samples and four sub-slab vapor samples. Field duplicates will be collected at rate of 10 percent with one trip blank (laboratory-supplied blank) per site. Therefore, one trip blank, two field duplicate soil samples, and one duplicate groundwater sample will be collected. Field duplicates for sub-slab vapor samples are not planned. Soil boring logs and field notes will be recorded during the field work. **Exhibits 2** and **3** (**Appendix A**) depicts the approximate proposed soil, groundwater, and soil vapor sampling locations. The proposed sample locations are designed to assess potential impacts associated with the on-site RECs and also to evaluate the overall extent of such impacts on the site.

Soil samples will be field screened with a photoionization detection (PID) to detect potential volatile organic vapors. Soil boring logs and field notes will be recorded during the field work. Exterior samples will be analyzed for hexavalent chromium (CrVI). Interior soil and groundwater samples will focus on volatile organic compounds (VOCs), the 13 Priority Pollutant metals, and hexavalent chromium (CrVI). Soil and groundwater pH will also be measured. Sub-slab vapor samples will be analyzed for VOCs.

Work will be conducted commensurate with the requirements set forth in the approved QAPP. Prior to mobilizing to the site to begin assessment activities, the property access agreement will be executed with the property owner, and the public utility location service (Blue Stakes of Utah) will be notified at least 48 hours prior to commencing any drilling activities. In addition, a private utility location service will be used to locate potential utilities or other subsurface obstacles in the immediate vicinity of each proposed drilling location.

1.4 Quality Objectives and Criteria (A7)

As discussed in the QAPP, Data Quality Objectives (DQOs) have been developed for sampling and analysis activities. DQOs identify the level of quality that the data must meet to provide a sound basis for decision-making activities during the project.

1.4.1 DQOs – Soil, Groundwater, and Soil Vapor Sampling

- **State the Problem:**
  According to the Phase I ESA, the site was residential from at least 1898 to the mid-1900s. The residences were demolished and the current commercial building was constructed by 1962. The site building was originally occupied by an electrical supply company and then a wholesale upholstery business. Since 1977, the building has been occupied by Schovaers Electronics, whose operations include electroplating. Use of the site as an electroplating facility for the past 38 years represents a REC to the site. In addition, improper disposal of 1,1,1-TCA was documented very near or on the property line on the north adjacent property (Crown Plating). Based on Terracon's Phase II ESA, dated February 8, 2016, sampling at the site identified soil impacts of hexavalent chromium concentrations above industrial and/or residential Regional Screening Levels (RSLs) in shallow soils across the site. Groundwater has been impacted by trichloroethene (TCE) above Maximum Contaminant Levels (MCLs) and/or Vapor Intrusion Screening Levels (VISLs), and hexavalent chromium below MCL and above the tapwater RSL. To support cleanup planning for redevelopment, additional information is needed regarding the vertical extent of hexavalent chromium in soil found in two areas on the exterior of the building, along with potential impacts beneath the building. . In addition, an assessment of the vapor intrusion potential from VOCs is needed to support cleanup planning.

- **Identify the decisions:**
  Determine whether soil or groundwater within the building confines have been impacted by hazardous substances, determine if current sub slab vapor concentration of VOCs exceed current EPA VISLs, and evaluate the vertical extent of hexavalent chromium in soils near the northeast and southwest corners of the property. Collect soil, groundwater, and soil sub slab vapor samples for laboratory analysis of the contaminants of concern (COCs) based on historical operations. Compare analytical data to relevant screening levels and determine what actions may be needed to support cleanup planning for redevelopment.

- **Identify inputs to the decision:**

Collect samples of soil, groundwater and sub slab vapor for analysis of COCs as detailed in Section 2.0 DATA GENERATION/ACQUISITION (B) of this SAP.

- **Define boundary of project:**
  The boundary of the study is limited to the Schovaers Electronics facility at 22 South Jeremy Street in Salt Lake City. Depth to groundwater was previously found at depths ranging from 9 to 11 feet bgs with a groundwater flow direction to the southwest. The exterior borings will be advanced to an approximate depth of 10 feet bgs within the site boundaries, at locations accessible to drilling equipment, at the approximate locations shown on **Exhibit 2** (**Appendix A**). Interior borings will be advanced to an approximate depth of 15 feet or 5 feet below the observed groundwater level, whichever is encountered first. Sub slab vapor samples will be collected within soils immediately below the floor slab.

- **Develop the decision rule:**
  Soil, groundwater and sub slab vapor samples will be collected at the approximate locations shown on **Exhibits 2** and **3** (**Appendix A**), for analyses as detailed within this SAP. Analytical results will be compared to the corresponding screening levels detailed in the attached tables.

  The data generated during this investigation will be compared to applicable screening levels including RSLs, MCLs, and VISLs. This evaluation will allow the development of remedial strategies, management plans, possible environmental restrictions and protective covenants providing necessary decision tools to aide in the property's re-development.

- **Specify limits on decision errors:**
  Sampling locations are biased towards locations where impacts are suspected. For this reason, the data are intended to represent a worst-case scenario for the site. Limited access for drilling and sampling equipment may introduce some level of uncertainty regarding the localized lateral extent of subsurface contamination, if present, at the identified features of concern. To reduce this uncertainty, the sampling design includes advancement of a sufficient number additional borings to define the overall extent of contamination, and to augment the results from the 2016 Phase II ESA. Decision errors will also be controlled by laboratory MDLs that are lower than the corresponding screening levels for various media as detailed in Tables 1A through 1C of this SAP. For a small percentage of analytes, cases may arise where a screening level is below the lowest practically attainable MDL and a "non-detect" value is reported. In such cases, the MDL will be compared to an alternate screening level for the same medium, where available, and/or the relative degree of uncertainty will be

stated with consideration of the presence or absence of other associated analytes within the same sample.

- **Optimize the design for obtaining data:**
  Based on the information obtained from the past investigation and the Terracon 2017 Phase I ESA, the proposed sampling locations and analytical program have been selected to augment the data from the 2016 Phase II ESA. This information is necessary to support cleanup planning.

1.4.2 Performance/Measurement Criteria

Performance and measurement criteria are detailed in Section A7 of the QAPP. Data quality indicators (DQIs) will be used to evaluate the performance and measurement criteria in terms of precision (analytical and/or total measurement error determination), accuracy, completeness, representativeness, and comparability. Anticipated concentrations of the parameters of interest are anticipated to range from levels below the method detection limits to concentrations that exceed the action levels.

1.4.3 Comparative Screening Levels

Soil, groundwater and soil vapor analytical results will be evaluated for residential as well as commercial/retail land use. **Tables 1A**, **1B** and **1C** (**Appendix B**) itemize the screening levels to be used for comparisons for each media to support project decisions regarding cleanup planning for redevelopment. For comparison of detected analytes that have multiple screening levels, the order of precedence of comparative screening levels will vary by media, contaminant type, and applicability.

The pH of the soil and groundwater will also be evaluated. Groundwater pH will be measured in the field, using standard calibrated equipment, and soil pH will be analyzed by the laboratory, using EPA Method 9045D. The UGWQPS for pH is between 6.5 and 8.5. Soil pH results will be compared to the EPA corrosivity screening thresholds for waste characterization (pH less than or equal to 2, or greater than or equal to 12.5).

Based on results from previous investigations, Terracon anticipates that arsenic concentrations in soil may exceed the RSLs but at relatively low levels that are typical of naturally occurring concentrations. If such RSL exceedances for arsenic in soil are identified, the potential need to address arsenic during cleanup will be further evaluated in the Phase II report and/or subsequent ABCA, and will depend upon on the identified arsenic concentrations and whether they are consistent with naturally occurring levels and compatible with planned land use.

The detection limits for soil, groundwater, and soil vapor samples will be in accordance with the established analytical methods. ESC Lab Sciences will perform the soil, groundwater,

and soil vapor analyses. The analytical methods and associated detection limits for each contaminant type are summarized in **Table 2** (**Appendix B**).

1.5 Specialized Training (A8)

Details of training and certification requirements are provided in Section A8 of the QAPP.

1.6 Documentation and Records (A9)

Details of documentation and recording procedures are provided in Section A9 of the QAPP.

2.0 DATA GENERATION/ACQUISITION (B)

2.1 Sampling Process Design (B1)

The sampling strategy for soil, groundwater, and soil vapor has been designed to assess the vertical and horizontal extent of impacts to soils or groundwater at the site in order to augment the previous data as needed to develop cleanup planning documents for the site. Exterior borings are designed to assess the vertical extent of hexavalent chromium in areas where concentrations during the previous investigation were reported above the EPA RSL's. The Interior borings are designed to assess the subsoil conditions below the building that were not investigated previously for the presence of metals, hexavalent chromium and VOC's in both soil and groundwater. Sub-slab vapor sampling will assess the potential for vapor intrusion within the footprint of the existing structure.

Nine (9) soil borings will be advanced on the site to allow collection of subsurface soil and groundwater samples, using direct-push drilling equipment. The proposed drilling and sampling locations are depicted on the Site Diagrams (**Exhibits 2** and **3**, **Appendix A**). A description of the sample types, sample naming convention, and laboratory analyses are presented in **Table 3A** (**Appendix B**) for the soil and groundwater samples and **Table 3B (Appendix B)** for the sub slab vapor samples.

The soil borings will be advanced to a maximum depth of approximately 15 feet bgs or to a sufficient depth to allow collection of groundwater samples, or until refusal, whichever occurs first. The exact location of each boring will be dictated by the drilling equipment's access constraints and safety. Such access constraints may include existing heavy shop equipment, subsurface utilities, limited working space, overhead ceiling clearances, and other obstacles associated with the facility operations. Wherever possible, off-set boring locations will be biased such that they are placed on the presumed down-gradient side (west or southwest) of any feature of concern that is inaccessible.

After sample collection is completed, each boring will be properly abandoned by backfilling with bentonite clay pellets, adding water to hydrate the bentonite clay, and restoring the

surface with native soil, asphalt, or concrete patch as appropriate to match the surrounding area. Samples will be delivered to the analytical laboratory within holding times for all analytical methods to generate definitive analytical data, which are critical to this assessment.

Site-specific conditions may require an adjustment to the field program and a deviation from this SAP to accommodate site-specific needs. If an adjustment or deviation becomes necessary, the activities and reasoning will be documented and implemented. The Salt Lake County Brownfields Grant Project Manager, and EPA Project Officer, and UDEQ-DERR will be notified if the adjustment is determined to be a significant one. Such adjustments (for example, adjustments in sampling locations) may introduce some degree of variability, which will be reconciled with project information by evaluating whether contaminant levels may be underestimated or overestimated, and how this may affect eventual site management or cleanup approaches, if applicable.

Tables 3A and **3B** (**Appendix B**) provide a summary description of the proposed sample locations, sample types, sample naming convention, and laboratory analyses. Field duplicates will be collected at rate of 10 percent with one trip blank (laboratory-supplied blank) per site. Therefore, one trip blank, two field duplicate soil samples, and one duplicate groundwater sample will be collected. Field duplicates for sub-slab vapor samples are not planned.

2.2 Sampling Methods (B2)

2.2.1 Soil Sampling

Soil samples will be collected from direct-push borings following the procedures detailed in *Standard Operating Procedure (SOP) 5, Geoprobe Sampling*, which is provided in Appendix B of the EPA-approved QAPP. During advancement of the borings, soils will be logged as detailed in *SOP 1, Soil Sampling and Logging,* provided in Appendix B of the EPA-approved QAPP.

- Sample locations SE-SB-16 and SE-SB-17 (Exterior): Four soil samples will be collected from each boring at the predetermined depths of2.5', 5', 7.5' and 10' bgs for vertical delineation of hexavalent chromium in soils.

- Sample Locations SE-SB-18 through SE-SB-24 (Interior): Two soil samples will be collected from each boring. One soil sample will be collected from soil exhibiting the most elevated PID readings. If no elevated PID reading is observed, one sample will be collected within 2' to 3' below the floor slab and the second at 8' bgs, or from the interval most likely to contain environmental impacts as determined in the field by the sampling professional.

2.2.2 Groundwater Sampling

Groundwater samples will be collected from the seven (7) interior direct-push borings following the procedures detailed in SOP 5, *Geoprobe Sampling*.

2.2.3 Sub-Slab Vapor Sampling

Sub-slab vapor samples will be collected from vapor pins installed within the concrete floor slab. Installation of the vapor pins and collection of the samples is described in detail in SOP-E.2120, Soil Gas Sampling – Sub-slab pin method located in Appendix B of this SAP.

2.3 Sample Handling and Custody (B3)

Details of sample handling and custody are provided in Section B3 of the QAPP.

2.4 Analytical Methods (B4)

Details for analytical methods are provided in Section B4 of the QAPP.

2.5 Quality Control (B5)

Details for quality control are provided in Section B5 of the QAPP.

2.6 Instrument/Equipment Testing, Inspection, and Maintenance (B6)

Requirements for instrument and equipment testing, inspection, and maintenance are provided in Section B6 of the QAPP.

2.7 Instrument/Equipment Calibration and Frequency (B7)

Requirements for instrument and equipment calibration and frequency are provided in Section B7 of the QAPP.

2.8 Inspection/Acceptance for Supplies and Consumables (B8)

Details for inspection and acceptance for supplies and consumables are provided in Section B8 of the QAPP.

2.9 Use of Existing Data (Non-direct Measurements) (B9)

Details for use of existing data are provided in Section B9 of the QAPP.

2.10 Data Management (B10)

Details for data management are provided in Section B10 of the QAPP.

3.0 ASSESSMENT AND OVERSIGHT (C)

3.1 Assessments and Response Actions (C1)

Details for assessment and response actions are provided in Section C1of the QAPP.

3.2 Reports to Management (C2)

Reporting requirements are provided in Section C2 of the QAPP.

4.0 DATA VALIDATION AND USABILITY (D)

4.1 Data Review, Verification, and Validation (D1)

The Terracon Project Manager will be responsible for data management on this project. Details for data review, verification, and validation is provided in Sections D1, D2, and D3 in the QAPP.

4.2 Verification and Usability Methods (D2)

Data collected during this project will be collected according with this SAP and the QAPP. Details for data review, verification, and validation are provided in Sections D2 and D3 in the QAPP.

5.0 REFERENCES

Terracon Consultants, Inc. (Terracon)

2015 *Phase I Environmental Site Assessment, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County,* July 1, 2015.

2016 *Phase II Environmental Site Assessment, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County,* February 8, 2016.

2017 *Community-Wide Quality Assurance Project Plan (Revision 1), Salt Lake County Brownfields Assessments, EPA Cooperative Agreement No. 96835701, Salt Lake County, Utah, April 25, 2017.*

2017 Draft *Phase I Environmental Site Assessment, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County,* December 29, 2017.

2017 EPA Superfund Explanation of Significant Differences, Kennecott North Zones Site, EPA ID:UTD070926811, Magna, Utah, Kennecott South Zone Site, EPA ID: UTD000826404, Copperton, Utah, August 2017.

TABLE 1A
SCREENING LEVELS FOR CONTAMINANTS OF CONCERN -

Cas#	Parameter	EPA RSL Soil Resident	EPA RSL Soil Industrial	EPA RSL Tapwater	Utah DEQ-DERR ISL		UGWQPS	Federal MCL	MDL (Soil)	MDL (Water)	EPA VISL Target GW
					Soil	GW					
		(mg/kg)	(mg/kg)	(mg/L)	n	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)	(µg/L)
156-59-2	cis-1,2-Dichloroethene	160	2,300	0.036	--	--	0.07	0.07	0.000235	0.000235	--
156-60-5	trans-1,2-Dichloroethene	1,600	23,000	0.36	--	--	0.1	0.1	0.000264	0.000264	--
78-87-5	1,2-Dichloropropane	2.5	11	0.00085	--	--	0.005	0.005	0.000358	0.000358	2.4
142-28-9	1,3-Dichloropropane	1,600	23,000	0.37	--	--	--	--	0.000279	0.000207	--
108-20-3	Di-isopropyl ether	2,200	9,400	1.5	--	--	--	--	0.000248	0.000248	7000
100-41-4	Ethylbenzene	5.8	25	0.0015	5	0.7	0.7	0.7	0.000297	0.000297	3.5
87-68-3	Hexachloro-1,3-butadiene	1.2	5.3	0.00014	--	--	--	--	0.000342	0.000342	--
98-82-8	Isopropylbenzene (Cumene)	1,900	9,900	0.45	--	--	--	--	0.000243	0.000243	--
78-93-3	2-Butanone (MEK)	27,000	190,000	5.6	--	--	--	--	0.00468	0.00468	5500000
75-09-2	Methylene Chloride	57	1,000	0.011	--	--	--	0.005	0.001	0.001	760
108-10-1	4-Methyl-2-pentanone (MIBK)	3,300	14,000	6.3	--	--	--	--	0.00188	0.00188	--
1634-04-4	Methyl tert-butyl ether	47	210	0.014	0.3	0.2	--	--	0.000212	0.000212	450
91-20-3	Naphthalene	3.8	17	0.00017	51	0.7	--	--	0.001	0.001	4.6
103-65-1	n-Propylbenzene	3,800	24,000	0.66	--	--	--	--	0.000206	0.000206	--
100-42-5	Styrene	6,000	35,000	1.2	--	--	0.1	0.1	0.000234	0.000234	9300
630-20-6	1,1,1,2-Tetrachloroethane	2	8.8	0.00057	--	--	--	--	0.000264	0.000264	3.7
79-34-5	1,1,2,2-Tetrachloroethane	0.6	2.7	0.000076	--	--	--	--	0.000365	0.000365	
62	1,1,2-Trichlorotrifluoroethane	6,700	28,000	10	--	--	--	--	0.000365	0.000365	--
127-18-4	Tetrachloroethene	24	100	0.011	--	--	0.005	0.005	0.000276	0.000276	15
108-88-3	Toluene	4,900	47,000	1.1	9	1	1	1	0.000434	0.000434	19000
87-61-6	1,2,3-Trichlorobenzene	63	930	0.007	--	--	--	--	0.000306	0.000306	--
120-82-1	1,2,4-Trichlorobenzene	24	110	0.0012	--	--	0.07	0.07	0.000388	0.000388	--
71-55-6	1,1,1-Trichloroethane	8,100	36,000	8	--	--	0.2	0.2	0.000286	0.000286	7400
79-00-5	1,1,2-Trichloroethane	1.1	5	0.00028	--	--	0.005	0.005	0.000277	0.000277	5.2
79-01-6	Trichloroethene	0.94	6	0.00049	--	--	0.005	0.005	0.000279	0.000279	1.2
75-69-4	Trichlorofluoromethane	23,000	350,000	5.2	--	--	--	--	0.000382	0.000382	180
96-18-4	1,2,3-Trichloropropane	0.0051	0.11	0.00000075	--	--	--	--	0.000741	0.000741	22

TABLE 1A
SCREENING LEVELS FOR CONTAMINANTS OF CONCERN -

Cas#	Parameter	EPA RSL Soil Resident	EPA RSL Soil Industrial	EPA RSL Tapwater	Utah DEQ-DERR ISL		UGWQPS	Federal MCL	MDL (Soil)	MDL (Water)	EPA VISL Target GW
					Soil	GW					
		(mg/kg)	(mg/kg)	(mg/L)	n	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/kg)	(µg/L)
95-63-6	1,2,4-Trimethylbenzene	300	1,800	0.056	--	--	--	--	0.000211	0.000211	29
526-73-8	1,2,3-Trimethylbenzene	340	2,000	0.055	--	--	--	--	0.000287	0.000287	29
108-67-8	1,3,5-Trimethylbenzene	270	1,500	0.06	--	--	--	--	0.000266	0.000266	--
75-01-4	Vinyl chloride	0.059	1.7	0.000019	--	--	0.002	0.002	0.000291	0.000291	0.15
1330-20-7	Xylenes, Total	580	2,500	0.19	142	10	10	10	0.000698	0.000698	490

EPA RSL – USEPA Regional Screening Level (November 2017)

EPA VISL – Vapor Intrusion Screening Level for Target Ground Water Conc. @ TCR = 1E-06 or THQ = 1

Utah UGWQPS – Utah Ground Water Quality Protection Standard (UAC R317-6-2.1)

CAS – Chemical Abstracts Service

mg/kg – milligrams per kilogram, mg/L – milligrams per liter

NE -- Not Established

TABLE 1B
EPA VAPOR INTRUSION SCREENING LEVELS (VISL) FOR VOCs IN SUB-SLAB VAPOR

CAS #	Parameter	Target Sub Slab Residential ($\mu g/m^3$)	Target Sub Slab Comercial ($\mu g/m^3$)	RDL ($\mu g/m^3$)	MDL ($\mu g/m^3$)
67-64-1	ACETONE	110,000	4,600,000	2.97	0.135
107-05-1	ALLYL CHLORIDE	16	88	0.626	0.171
75-27-24	BENZENE	12	52	0.639	0.147
100-44-7	BENZYL CHLORIDE	1.9	8.3	1.04	0.311
75-27-4	BROMODICHLOROMETHANE	2.5	11	1.34	0.292
75-25-2	BROMOFORM	85	370	6.21	0.813
74-83-9	BROMOMETHANE	170	730	0.776	0.236
106-99-0	1,3-BUTADIENE	3.1	14	4.43	0.125
75-15-0	CARBON DISULFIDE	24,000	100,000	0.622	0.169
56-23-5	CARBON TETRACHLORIDE	16	68	1.26	0.368
108-90-7	CHLOROBENZENE	1,700	7,300	0.924	0.278
75-00-3	CHLOROETHANE	NE	NE	0.528	0.129
67-66-3	CHLOROFORM	4.1	18	0.973	0.279
74-87-3	CHLOROMETHANE	3,100	13,000	0.413	0.112
95-49-8	2-CHLOROTOLUENE	NE	NE	1.03	0.312
110-82-7	CYCLOHEXANE	210000	880,000	0.689	0.184
124-48-1	CHLORODIBROMOMETHANE	NE	NE	1.7	0.42
106-93-4	1,2-DIBROMOETHANE	0.16	0.68	1.54	0.142
95-50-1	1,2-DICHLOROBENZENE	7,000	29,000	1.2	0.363
541-73-1	1,3-DICHLOROBENZENE	NE	NE	1.2	0.359
106-46-7	1,4-DICHLOROBENZENE	8.5	37	1.2	0.335
107-06-2	1,2-DICHLOROETHANE	3.6	16	0.81	0.249
75-34-3	1,1-DICHLOROETHANE	58	260	0.802	0.206
75-35-4	1,1-DICHLOROETHENE	7,000	29,000	0.793	0.194
156-59-2	CIS-1,2-DICHLOROETHENE	NE	NE	0.793	0.154
156-60--5	TRANS-1,2-DICHLOROETHENE	NE	NE	0.793	0.184
78-87-5	1,2-DICHLOROPROPANE	25	110	0.924	0.277
10061-01-5	CIS-1,3-DICHLOROPROPENE	NE	NE	0.908	0.267
10061-02-6	TRANS-1,3-DICHLOROPROPENE	NE	NE	0.908	0.197
123-91-1	1,4-DIOXANE	19	82	0.721	0.2
64-17-5	ETHANOL	NE	NE	1.19	0.157
100-41-4	ETHYLBENZENE	37	160	0.867	0.219
622-96-8	4-ETHYLTOLUENE	NE	NE	0.982	0.327
75-69-4	TRICHLOROFLUOROMETHANE	NE	NE	1.12	0.378
75-71-8	DICHLORODIFLUOROMETHANE	3,500	14,000	0.989	0.297
67-13-1	1,1,2-TRICHLOROTRIFLUOROETHANE	170,000	730,000	1.53	0.527
76-14-2	1,2-DICHLOROTETRAFLUOROETHANE	NE	NE	1.4	0.32
142-85-5	HEPTANE	14,000	58,000	0.818	0.256
87-68-3	HEXACHLORO-1,3-BUTADIENE	4.3	19	6.73	0.7

TABLE 1B
EPA VAPOR INTRUSION SCREENING LEVELS (VISL) FOR VOCs IN SUB-SLAB VAPOR

CAS #	Parameter	Target Sub Slab Residential ($\mu g/m^3$)	Target Sub Slab Comercial ($\mu g/m^3$)	RDL ($\mu g/m^3$)	MDL ($\mu g/m^3$)
142-82-5	N-HEXANE	14,000	100,000	0.705	0.161
98-82-8	ISOPROPYLBENZENE	14,000	58,000	0.983	0.277
75-09-2	METHYLENE CHLORIDE	3,400	150,000	0.694	0.161
108-10-1	METHYL BUTYL KETONE	10,000	440,000	5.11	0.279
78-93-3	2-BUTANONE (MEK)	17,000	730,000	3.69	0.145
108-10-1	4-METHYL-2-PENTANONE (MIBK)	10,000	440,000	5.12	0.266
80-62-6	METHYL METHACRYLATE	24,000	100,000	0.819	0.317
1634-04-4	METHYL TERT-BUTYL ETHER	360	1,600	0.721	0.182
91-20-3	NAPHTHALENE	2.8	12	3.3	0.806
67-63-0	2-PROPANOL	7,000	29,000	3.07	0.217
115-07-1	PROPENE	10,000	440,00	0.689	0.16
100-42-5	STYRENE	35,000	150,000	0.851	0.198
630-20-6	1,1,2,2-TETRACHLOROETHANE	13	55	1.37	0.396
127-18-4	TETRACHLOROETHENE	360	1,600	1.36	0.337
109-99-9	TETRAHYDROFURAN	70,000	290,000	0.59	0.15
108-88-3	TOLUENE	170,000	730,000	0.753	0.188
120-82-1	1,2,4-TRICHLOROBENZENE	70	290	4.66	1.1
71-55-6	1,1,1-TRICHLOROETHANE	170,000	730,000	1.09	0.362
79-00-5	1,1,2-TRICHLOROETHANE	5.8	100	1.09	0.156
79-01-6	TRICHLOROETHENE	16	100	1.07	0.292
95-63-6	1,2,4-TRIMETHYLBENZENE	2,100	8,800	0.982	0.237
108-67-8	1,3,5-TRIMETHYLBENZENE	2,100	8,800	0.982	0.31
25167-70-8	2,2,4-TRIMETHYLPENTANE	NE	NE	0.934	0.213
75-01-4	VINYL CHLORIDE	5.6	93	0.511	0.117
593-60-2	VINYL BROMIDE	2.9	13	0.875	0.318
108-05-4	VINYL ACETATE	7,000	29,000	0.704	0.225
179601-23-1	M&P-XYLENE	3,500	15,000	1.73	0.41
95-47-6	O-XYLENE	3,500	15,000	0.867	0.274

TABLE 1C
SCREENING LEVELS FOR CONTAMINANTS OF CONCERN - METALS IN SOIL AND GROUNDWATER

Analyte	CAS No.	EPA RSL Resident Soil	EPA RSL Industrial Soil	EPA RSL Tapwater	Utah UGWQPS	Federal MCL	Method Detection Limits	
							Soil	Water
		(mg/kg)	(mg/kg)	(mg/L)	(mg/L)	(mg/L)	(mg/kg)	(mg/L)
Antimony	7440-36-0	31	470	0.0078	0.006	0.006	0.75	0.0075
Arsenic	7440-38-2	0.68	3	0.000052	0.05	0.01	0.65	0.0065
Beryllium	7440-41-7	160	2300	0.025	0.004	0.004	0.07	0.0007
Cadmium	7440-43-9	71	980	0.0092	0.005	0.005	0.07	0.0007
Chromium (Total-Dissolved) [1]	7440-47-3	120,000	1,800,000	22	0.1	0.1	0.14	0.0014
Hexavalent Chromium	18540-29-9	0.3	6.3	0.000035	--	--	0.64	0.00002
Copper	7440-50-8	3,100	47,000	0.8	1.3	1.3	0.53	0.0053
Lead	7439-92-1	400	800	0.015	0.015	0.015	0.19	0.0019
Mercury	7439-97-6	9.4	40	0.00063	0.002	0.002	0.0028	0.000049
Nickel[2]	7440-02-0	840	12,000	0.2	--	--	0.49	0.0049
Selenium	7782-49-2	390	5,800	0.1	0.05	0.05	0.74	0.0074
Silver	7440-22-4	390	5,800	0.094	0.1	--	0.28	0.0028
Thallium[3]	7440-28-0	0.78	12	0.0002	0.002	0.002	0.65	0.0065
Zinc	7440-66-6	23,000	350,000	6	5	--	0.59	0.0059

EPA RSL – USEPA Regional Screening Level (November 2017)
EPA VISL – Vapor Intrusion Screening Level for Target Ground Water Conc. @ TCR = 1E-06 or THQ = 1
Utah UGWQPS – Utah Ground Water Quality Protection Standard (UAC R317-6-2.1)
CAS – Chemical Abstracts Service
mg/kg – milligrams per kilogram, mg/L – milligrams per liter
NE -- Not Established

1) EPA RSLs are for Chromium III (insoluble salts)
2) EPA RSLs are for Nickel Oxide
3) EPA RSLs are for Thallium (soluble salts)

TABLE 2
ANALYTICAL METHOD SUMMARY

Parameter	Matrix (Solid/Liquid/Soil Gas)	Analytical Method	Sample container/ preservative	Holding Time	Laboratory Method Detection Limit (MDL)[1]
VOCs	Soil	SW-846 8260B	(1) 4 oz glass, none, 4°C	14 days	0.01 to 0.000199
VOCs	Groundwater	SW-846 8260B	(3) 40 ml vial glass, HCL, 4°C	14 days	0.01 to 0.00023
VOCs	Soil Gas	T0-15	400 ml, none	30 days	2.1 to 53.5
Metals (13 Priority Pollutants+Cr(VI))	Soil	SW-846 6010B, 3060A/7196A, 7471	(1) 4 oz glass, 4°C	180 days	0.0028 to 0.74
Metals (13 Priority Pollutants)	Groundwater	SW-846 6010B, 6020B, 6020	(1) 250 ml poly, HNO_3, 4°C (2)	180 days	0.00002 to 0.0075
Cr(VI)	Groundwater	7199, 7470	(1) 250 ml poly, HNO_3, 4°C (2)	28 days	0.00002 to 0.0075
pH	Soil	SW-846 9045D	(1) 4 oz glass, 4°C	24 hours	0-14
pH	Groundwater	Field	NA	15 minutes	0-14

1 – MDL in milligrams per liter (mg/L) for groundwater, milligrams per kilogram (mg/kg) for soil and (µg/m3) for soil gas
(2) – Metals to be filtered in the field using a 0.45 µm filter
NA – Not applicable

TABLE 3A
SUMMARY OF SOIL BORINGS

Sample Location	Rationale	Sample IDs	Sample Matrix	Analytes
Northeast corner of property (exterior of building)	Area where Cr (VI) was found above RSLs, assess vertical soil impacts	SE-SB-16 2.5 ft SE-SB-16 5 ft SE-SB-16 7.5 ft SE-SB-16 10 ft	SS SS SS (Hold SS (Hold)	Cr(VI), pH
Southwest corner of property (exterior of building)	Area where Cr (VI) was found above RSLs, assess vertical soil impacts	SE-SB-17 2.5 ft SE-SB-17 5 ft SE-SB-17 7.5 ft SE-SB-17 10 ft	SS SS SS (Hold) SS (Hold)	Cr(VI), pH
Drill Press/ Router Room	Assess Northwest corner of building	SE-SB-18 2-3 ft SE-SB-18 8 ft	SS SS	13 PP Metals[a], Cr(VI), VOCsb, pH
		SE-SB-18 GW	GW	13 PP Metals[a], Cr(VI), VOCsb, pH
Washout Booth	Assess Northeast corner of building	SE-SB-19 2-3 ft SE-SB-19 8 ft	SS SS	13 PP Metals[a], Cr(VI), VOCsb, pH
		SE-SB-19-GW	GW	13 PP Metals[a], Cr(VI), VOCsb, pH
General area/sewer lateral and effluent sample location	Boring adjacent to sewer lateral and effluent collection point	SE-SB-20 2-3 ft SE-SB-20 8 ft	SS SS	13 PP Metals[a], Cr(VI), VOCsb, pH
		SE-SB-20 GW	GW	13 PP Metals[a], Cr(VI), VOCsb, pH
Plate Room	Floor sump connected to sewer line	SE-SB-212-3 ft SE-SB-21 8 ft	SS SS	13 PP Metals[a], Cr(VI), VOCsb, pH
		SE-SB-21 GW	GW	13 PP Metals[a], Cr(VI), VOCsb, pH
Plate Room	South wall, heavy staining	SE-SB-22 2-3 ft SE-SB-22 8 ft	SS SS	13 PP Metals[a], Cr(VI), VOCsb, pH
		SE-SB-22 GW	GW	13 PP Metals[a], Cr(VI), VOCsb, pH
Plate Room	Center of room adjacent to acid tank and electrolysis copper tank	SE-SB-23 2-3 ft SE-SB-23 8 ft	SS SS	13 PP Metals[a], Cr(VI), VOCsb, pH
		SE-SB-23 GW	GW	13 PP Metals[a], Cr(VI), VOCsb, pH
Plate Room	West wall, heavy staining	SE-SB-24 2-3 ft SE-SB-24 8 ft	SS SS	13 PP Metals[a], Cr(VI), VOCsb, pH
		SE-SB-24 GW	GW	13 PP Metals[a], Cr(VI), VOCsb, pH

a – 13 Priority Pollutant Metals. b – volatile organic compounds. SS – Soil Sample. GW – Groundwater Sample

TABLE 3B
SUMMARY OF SUB-SLAB SOIL GAS SAMPLING

Sample Location	Rationale	Sample IDs	Sample Matrix	Analytes
Northwest part of building (interior of building)	Assess vapor intrusion potential	SE-VP-1	SG	VOCs[a]
Northeast part of building (interior of building)	Assess vapor intrusion potential	SE-VP-2	SG	VOCs[a]
Adjacent to sewer lateral (interior of building)	Assess vapor intrusion potential	SE-VP-3	SG	VOCs[a]
Plate Room (interior of building)	Assess vapor intrusion potential	SE-VP-4	SG	VOCs[a]

a – volatile organic compounds.
SG – Soil gas

APPENDIX C

TERRACON BROWNFIELDS STANDARD OPERATING PROCEDURES

E.2120
SOIL GAS SAMPLING – SUBSLAB PIN METHOD
(Replaces former E.2100)

Last Revision/Review: March 2014
Reviewer/Office: DEK/Corporate

Objective

The objective of subslab or subfloor soil gas/vapor sampling is to provide an estimate of the concentration of vapors that may be released by subsurface soils and potentially enter pathways that could produce airborne exposures to receptors in buildings or structures. The purpose of this document is to provide guidance and recommended standard practices for conducting sub-slab soil gas sampling to Terracon personnel.

Many states have vapor encroachment, vapor intrusion and/or soil gas sampling guidance documents with specific requirements or recommended procedures for soil gas sampling. State-specific requirements and guidance supersede this guidance document and Terracon personnel should adhere to the most current state-specific guidance when conducting soil gas investigations. If state-specific requirements are less stringent than the procedures recommended in this guidance, it is recommended that the procedures in this guidance be utilized.

For states where specific vapor encroachment, vapor intrusion and/or soil gas sampling regulations or guidance are not in place, Terracon personnel should consult this guidance document and the recommended standard practices herein.

This application involves effects on indoor air quality (i.e., borings are beneath an occupied or potentially occupied structure), sampling requires the participation / review of a Terracon industrial hygienist (IH) in selecting methods and scoping work. Engaging an IH is encouraged in addressing any airborne contaminants. For direction to local or regional technical assistance, contact the Chair of the Industrial Hygiene Practice Resource Group on the Environmental Services Terranet webpage. Click here if viewing electronically.

Implementation

The *Guidance Document* provides basic guidelines and field procedures for conducting subslab or subfloor soil gas vapor sampling. Subslab soil gas data from samples collected under the building slab and within the advective envelope of the building-driven pressurization or depressurization indicates whether contaminants have accumulated directly under the building.

This is Terracon's preferred method for soil gas evaluation for sites with existing buildings with foundations above the water table.

Procedures

Since 2013, Terracon addresses all soil gas and subslab soil vapor sampling through special guidance prepared by the Vapor Encroachment/Intrusion Committee. Staff should use Terracon's *Soil Gas Investigation Guidance Document (Version 1.0, August 7, 2013)*, or most current version. This document is available on the Environmental Services Terranet webpage. Click here if viewing electronically.

Procedures shall be as specified in *4.0 SUBSLAB SOIL GAS SAMPLING PROTOCOL* of the *Guidance Document*.

Quality assurance and quality control procedures should be incorporated into property-specific sampling and analysis plans from 5.0 LEAK DETECTION AND QA/QC of the *Guidance Document*.

The *Guidance Document* must be attached to this TSOP for field use.

Other Supporting References

- *Final Guidance For Assessing And Mitigating The Vapor Intrusion Pathway From Subsurface Sources To Indoor Air (Draft)*, U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response, April 2013.

Soil Gas Investigation Guidance Document

Version 1.0

August 7, 2013

Prepared by:

Vapor Encroachment/Intrusion Committee

Terracon Soil Gas Investigation Guidance

APPENDICES

Appendix A – Soil Gas Implant Method: Equipment/Materials List, Procedures, and Field Data Form

Appendix B – Post-Run Tubing Method: Equipment/Materials List, Procedures, and Field Data Form

Appendix C – Subslab Soil Gas: Equipment/Materials List, Procedures, and Field Data Form

Appendix D – Available Soil Gas Analytical Methods

Appendix E – References

1.0 INTRODUCTION AND PURPOSE

Vapor encroachment is defined as vapor-phase migration of volatile organic compounds (VOCs) onto a property from underlying contaminated groundwater, soil, non-aqueous phase liquid (NAPL), and/or soil gas. Vapor intrusion is defined as vapor-phase migration of VOCs into occupied buildings from underlying contaminated groundwater, soil, NAPL, and/or soil gas.

Soil gas surveys provide information on the soil atmosphere that can aid in assessing the presence, composition, source, and distribution of contaminants. Soil gas and subslab soil gas data are important components of vapor encroachment and vapor intrusion investigations and are central to the evaluation of the potential for vapor intrusion, as outlined in U.S. EPA guidance and various state guidance documents.

1.1 Purpose and Intent

The purpose of this document is to provide general guidance and recommended standard practices for conducting soil gas sampling to Terracon personnel. Many states have vapor encroachment, vapor intrusion and/or soil gas sampling guidance documents with specific requirements or recommended procedures for soil gas sampling. State-specific requirements and guidance supersede this guidance document and Terracon personnel should adhere to the most current state-specific guidance when conducting soil gas investigations. If state-specific requirements are less stringent than the procedures recommended in this guidance, it is recommended that the procedures in this guidance be utilized.

For states where specific vapor encroachment, vapor intrusion and/or soil gas sampling regulations or guidance are not in place, Terracon personnel should consult this guidance document and the recommended standard practices herein.

1.2 Limitations

Limitations and topics excluded from this guidance are as follows.

- This guidance does not include the collection of indoor air samples for vapor intrusion assessments. If indoor air sample collection is warranted on your project, please contact one of the members of the Vapor Encroachment/Intrusion Committee (refer to Section 1.3) and consult with a Terracon Certified Industrial Hygienist (CIH) that has the requisite indoor air sampling experience.
- An Authorized Project Reviewer (APR) with vapor encroachment and/or vapor intrusion experience must be assigned to and participate in the project from proposal preparation through completion.

- This guidance only includes active soil gas sample collection methods. Passive soil gas sampling methods do not yield truly quantitative results; however, they can be useful as a screening tool or to delineate affected zones. If you are considering the use of passive soil gas methods, please contact one of the members of the Vapor Encroachment/Intrusion Committee.
- As noted above, state-specific requirements and guidance supersede this guidance document.
- This guidance document only covers soil gas investigation and sampling and does not address the evaluation of soil gas sampling data for vapor intrusion evaluations. Due to the various data evaluation approaches currently being utilized in the industry, contact one of the members of the Vapor Encroachment/Intrusion Committee for assistance with data evaluation if there are no specific risk-based levels or criteria established for your state.

This guidance is not intended to be an all-inclusive guide to soil gas sampling, but rather to provide standard guidelines and recommended practices. There are various resources and guidance documents that cover vapor intrusion and soil gas sampling in depth. Refer to Appendix E for a list of useful references.

1.3 Vapor Encroachment/Intrusion Contacts

Questions concerning soil gas investigations, data evaluation, indoor air sampling, vapor intrusion assessments, or vapor mitigation, can be directed to one of the below-listed Terracon employees.

- Mike Hagemeister: Omaha NE, mehagemeister@terracon.com (Investigation and Mitigation)
- Matt Hall: Nashville TN, mbhall@terracon.com (Investigation and Mitigation)
- Michael Hudgins: Columbia SC, pmhudgins@terracon.com (Investigation and Mitigation)
- Scott Kolodziej: Dallas TX, smkolodziej@terracon.com (Investigation and Due Diligence)
- John Sallman: Corporate, jbsallman@terracon.com (Investigation and Due Diligence)
- Craig Eaton: Salt Lake City UT, cdeaton@terracon.com (Investigation and Due Diligence)
- David Wolfgram: White Bear Lake MN, djwolfgram@terracon.com (Investigation)
- Michael Crandall: Tempe AZ, mscrandall@terracon.com (CIH, Indoor Air Sampling)

A list of additional Vapor Encroachment/Intrusion Committee members and vapor encroachment/intrusion guidance resources are available on the SharePoint site on TerraNet (http://sp.terracon.com/ServiceLines/Env_New/VI/Pages/default.aspx).

2.0 SOIL GAS INVESTIGATION SCOPE DEVELOPMENT

2.1 Evaluation of Existing Data and Conceptual Site Model

The preparation of a conceptual site model (CSM) is part of all site investigations and begins in the proposal stage. The purpose of a CSM is to provide a conceptual understanding of the potential for exposure to hazardous contaminants at a site based on the sources of contamination, the release mechanisms, the transport media, the exposure pathways, and the potential receptors. The CSM relates the source of contamination to human and ecological receptors and identifies potential sources of contamination, the potentially contaminated media, and exposure pathways.

The level of detail in the CSM will depend upon the project and client objectives, and the requirements of the APR. In all circumstances, the CSM must contain sufficient detail so that field staff, the project manager, and the APR have a clear understanding of site conditions and how they relate to meeting the project objectives.

The following items should be included in a CSM for the vapor encroachment and/or intrusion pathway. In the early stages of investigation, each of the components listed may not be necessary. These may be added as applicable.

- Primary Sources of Contamination – For each potential contaminant source, describe what potentially caused the contamination and provide a list of chemicals released (either known or suspected) into the environment.
- Primary Release Mechanism – For each potential contaminant source, describe the means by which the release, or suspected release, is thought to have occurred.
- Secondary Sources of Contamination – Include the environmental media potentially contaminated or known to be contaminated by the primary sources, such as surface soil, subsurface soil, and groundwater.
- Contaminant Transport Mechanisms – For each potentially-contaminated medium, describe the transport mechanism (usually advection and diffusion through the vadose zone) for contaminant vapors to enter the property (vapor encroachment) or for contaminant vapors to enter the indoor air (vapor intrusion), and describe the characteristics of the subsurface including the site geology and depth to shallow groundwater. *Also consider whether any preferential contaminant migration pathways, such as sewer or utility lines, are present.*
- Exposure Routes – Describe current buildings, potential future building scenarios, as appropriate, and areas where vapors may accumulate. Discuss each potential preferential contaminant migration pathway associated with the buildings, such as foundation cracks, voids, utility ports, pipes, elevator shafts, sumps, and drain holes.

- Building Effects – For in-depth vapor intrusion investigations, evaluate the effects of the overlying building on vapor intrusion and associated dynamics. This evaluation may include measurements of differential pressures across the floor slab, determination of air exchange rates, and evaluation of temporal effects due to changes in the building HVAC system operation. (Note: This level of evaluation is not expected for limited, presence/absence vapor intrusion investigations conducted during property due diligence.)
- Potential Receptors – List each of the current and potential future receptors, as appropriate, that could potentially contact affected soil gas and/or indoor air.

To document current site conditions, a CSM may be supported by maps, subsurface cross-sections, site diagrams, and any other property/site specific details that may be pertinent. The narrative description should clearly describe known site conditions and state what assumptions were made to generate the CSM. As additional data are collected and analyzed through the evaluation of the vapor encroachment and/or intrusion pathways, the CSM should be updated.

Additional information on the development of a CSM can be found in guidance published by U.S. EPA, Risk Assessment Guidance for Superfund (RAGS, Part A, 1989), Standard Guide for Developing Conceptual Site Models for Contaminated Sites, ASTM E1689 - 95(2008), and/or U.S. EPA Data Quality Objective guidance.

2.2 Preparing a Soil Gas Sampling Plan/Proposal

A soil gas sampling plan/proposal should be site-specific and designed to meet the project objectives. The soil gas sampling plan/proposal should be prepared after evaluation of existing site information and analytical data. Also utilize the CSM to assist in developing a soil gas sampling strategy. The following items should be considered when developing a soil gas sampling plan/proposal:

- Selection of an appropriate Terracon APR
- Objectives of the study.
- Chemicals of concern (COCs) including parent and breakdown products. Note that the list of soil gas COCs should be consistent with the list of COCs analyzed in groundwater and/or soil if the assessment is being conducted as part of an LSI. This is an important consideration because "full VOC scan" lists can include different chemicals depending on the laboratory used, media analyzed, and analytical methods. A target COC list should be developed based on the type of source (e.g., dry cleaner or gas station) and the COCs detected in on-site soils or groundwater.
- Physical site characteristics (*e.g.*, soil type, depth to groundwater, water table fluctuations, building construction, etc.)

- Possible preferential pathways, including subsurface utilities and lithology (e.g., coarse-grained soils, shrink/swell clays with cracks, and fractured bedrock).
- Land use, building characteristics, and potential receptor population.
- Need for vertical profiles to assess potential biodegradation/attenuation.
- Appropriate soil gas probe installation and sampling protocols.
- Number, location and analytical method for soil gas samples to satisfy the project objectives.
- Appropriate QA/QC protocols, such as leak testing, sample duplicates, detection limits and limitations, and equipment blanks based on the project objectives and sensitivity.

Soil gas sampling proposal and work plan templates are available for reference on the vapor intrusion page on SharePoint/TerraNet.

http://sp.terracon.com/ServiceLines/Env_New/VI/Pages/default.aspx

2.3 Selection of Sample Locations

Proper sample locations will vary based on site-specific conditions and project objectives. For this reason, soil gas sampling plans and proposals are to be reviewed by an Authorized Project Reviewer (APR) with vapor encroachment and/or vapor intrusion expertise. For assistance with selecting the proper sampling locations for your site, contact one of the vapor encroachment/intrusion contacts in Section 1.3 of this guidance. General guidelines are presented below.

Buildings Present

For commercial properties with buildings above or in close proximity to impacted soils or groundwater, soil gas samples should be taken under the building (i.e., subslab sampling) due to the potential for vapor accumulation under the foundation and/or lowest level floor slab. Though plans are often not available, the building construction should be evaluated for potential non-uniform distribution of vapor accumulation (e.g., grade beam construction or multiple additions that may affect the distribution of vapors under various parts of the building). Subslab soil gas is also considered to best represent soil gas that has the potential to enter the overlying building and create a vapor intrusion condition, and is less susceptible to seasonal variations. If it is not practical to collect soil gas samples under the building, then the samples should be collected as close to the building as possible, while also taking into account: 1) proximity to the source of contamination; 2) depth of the foundation, lowest level floor slab, or basement; and 3) the areas with the highest potential for elevated soil gas concentrations based on the existing data and CSM.

Vacant Properties

For vacant properties where a building is proposed, soil gas samples should generally be collected within the proposed building footprint at locations that have the highest potential for soil gas impacts based on review of the existing data, the proposed building construction (e.g., slab penetration points, areas where vapors could accumulate, etc.) and the CSM. For vacant properties without a proposed development, soil gas samples should be collected from the locations with the highest potential for soil gas impacts based on review of the existing data and the CSM. Since the effects of the future overlying building on soil vapor COC distribution and dynamics are unknown when evaluating vacant properties, the sample depths should be located near the VOC source to represent reasonable worst-case conditions.

2.4 Selection of Sample Depths

Proper sample depths will vary based on site-specific conditions and project objectives. For this reason, soil gas sampling plans and proposals are to be reviewed by an Authorized Project Reviewer (APR) with vapor encroachment and/or vapor intrusion expertise. For assistance with selecting the proper sampling depths for your site, contact one of the vapor encroachment/intrusion contacts in Section 1.3 of this guidance. General guidelines are presented below.

Shallow Soil Gas Sampling Depth

Shallow soil gas is defined by the EPA OSWER SVIG Guidance as soil gas within 5 feet below grade surface (bgs). It is recommended that shallow soil gas samples be collected from depths ranging from 3 to 5 feet bgs. Collection of exterior shallow soil gas samples at depths less than 3 feet bgs increases the potential for "short-circuiting" with atmospheric air and also increases the potential for spatial and temporal variability (See Section 2.6). If exterior shallow soil gas samples are collected, then the leak detection protocols outlined in Section 5 of this guidance should be followed.

Research has shown that shallow soil gas samples collected along the perimeters of buildings often do not represent the concentrations of VOCs in the sub-slab soil gas due to effects of the overlying building on soil vapor COC distribution. In these cases, exterior soil gas samples collected near the source of subsurface contamination better represented sub-slab VOC concentrations. If exterior soil gas sampling must be conducted in lieu of sub-slab sampling for existing buildings, the sampling depth should be positioned near the source of VOCs.

Note: PID readings collected during soil gas probe advancement can be utilized to select the worst-case depth interval for placement of the sampling tip. If the soil gas probe advancement method does not generate soil cuttings for PID readings, such readings can be collected from a co-located soil boring in the vicinity of the soil gas probe so long as the soil boring is adequately plugged with hydrated bentonite or grout and the proper soil gas probe equilibration time is utilized.

Deep Soil Gas Sampling Depth

Sampling depths for deep soil gas samples (i.e., samples collected at depths greater than 5 feet bgs) will vary based on the project objectives. To obtain worst-case scenarios for soil gas concentrations, these samples should be collected in or proximate to the source(s) of contamination. When underlying groundwater and/or NAPL are the source of vapors, soil gas samples should be collected from immediately above the capillary fringe zone or NAPL.

For sites with existing or proposed basements, the soil gas probe/sampling tip should be advanced to a depth near the source of VOCs.

Additional soil gas samples may be collected throughout the soil profile to assess vapor distribution and possible bioattenuation at the site. As noted above, PID readings from soil cuttings can be utilized to select the worst-case depth interval for placement of the sampling tip(s).

Sub-Slab Soil Gas Samples

Sub-slab soil gas samples should be collected from the gravel or sand bedding material underlying the building slab. This is typically accomplished by drilling the sample port through the slab and into the bedding material, followed by placement of sample tubing that terminates within the slab (refer to Section 4.1).

2.5 Selection of Analytical Methods and Sample Containers

The most common and widely-accepted method for the analysis of VOCs in soil gas is EPA Method TO-15; however, there are various EPA methods and modified EPA methods currently utilized in the industry. The modified methods may offer significant cost savings over EPA Method TO-15. Refer to Appendix D for a table of the available soil gas analytical methods and typical cost ranges. *When selecting analytical methods, ensure that they are compatible with state regulations and guidance.*

When selecting an analytical method, there are two important things to remember:

1) Ensure the analytical method is appropriate for use in the state or jurisdiction in which the work is being conducted; and

2) Have the laboratory provide the method detection limits to ensure that they are sensitive (low) enough to compare the resulting data to the applicable regulatory risk-based screening levels.

The most common options for soil gas sample collection are Tedlar® bags and Summa canisters. Due to limited hold times associated with Tedlar® bags and research showing possible breakthrough and/or absorption of COCs, the use of Tedlar® bags is not recommended for Terracon soil gas investigations.

Summa canisters are recommended for use on Terracon soil gas investigations. Summa canisters are available in various sizes, with the most common sizes for soil gas sample collection being 6 liters (L) or 1 L. In many cases, 1-L Summa canisters are sufficient for the laboratory to obtain the desired detection limits for soil gas analysis. These smaller canisters are easier to use in the field and easier to package and ship. Refer to Figure 1 for a diagram of a Summa canister and associated flow regulator.

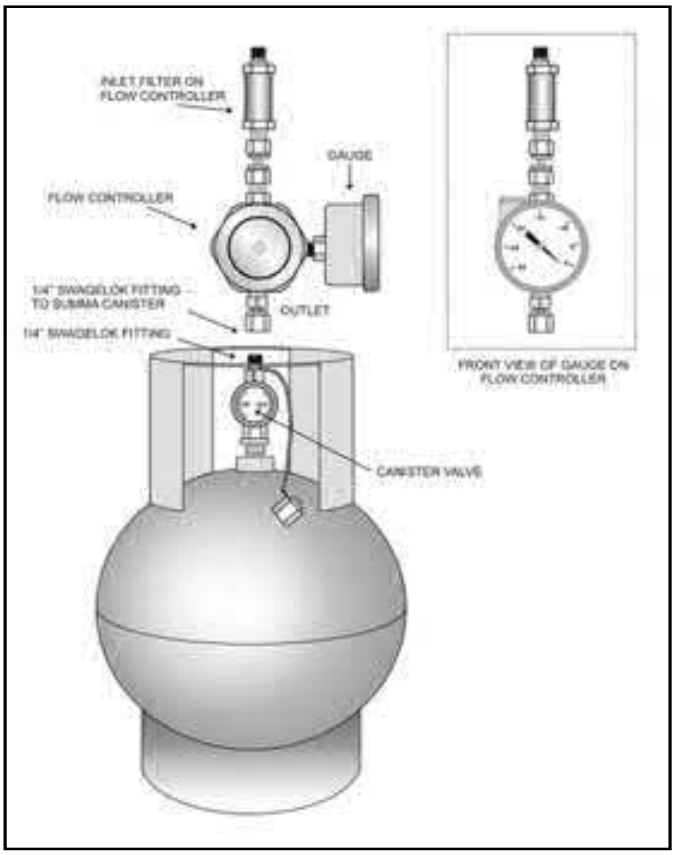

Figure 1: Typical Summa Canister Setup (Source: Ohio EPA, *Sample Collection and Evaluation of Vapor Intrusion to Indoor Air*, May 2010)

Summa canisters should always be provided by the laboratory and should at least be batch-certified as clean by the lab. The typical frequency for laboratory batch-certification of Summa canisters is one confirmatory analysis per 10 canisters. If a higher level of confidence is required based on the project objectives or sensitivity, contact the analytical laboratory about obtaining individually-certified clean Summa canisters.

When utilizing Summa canisters for sample collection, it is important that the canister vacuum be recorded: 1) immediately upon opening the canister and beginning sample collection; 2) at the end of sample collection; and 3) after receipt by the analytical laboratory. If the initial vacuum reading after opening a Summa canister does not indicate the canister is under full vacuum (typically 30 inches Hg of vacuum), do not utilize the container for sample collection. It is possible that vacuum was partially lost during shipment and that ambient air may have been introduced into the sample container. This is not an uncommon occurrence; therefore, it is suggested that at least one extra (i.e., back-up) Summa canister be ordered for a given sampling event. Options to handle this are further discussed in Section 3.3 of this guidance.

2.6 Consideration of Environmental Factors and Temporal Variability

Three common environmental factors can influence the results of a soil gas survey and should be considered when conducting a project. Following is a brief discussion of each:

- Temperature can have an effect on soil gas concentrations since both vapor pressure and water solubility are temperature dependent. However, temperature variations decrease with depth in the soil column and are unlikely to have a large influence on concentrations at five feet below grade or greater. In areas with large seasonal temperature variations, the most conservative values will be those collected in the summer months.
- Barometric Pressure can lead to a pressure gradient between the soil vapor and the atmosphere, resulting in the movement of soil vapors out of the vadose zone during barometric lows and the movement of atmospheric air into the vadose zone during barometric highs. The potential affects decrease with sampling depth.
- Precipitation and resulting infiltration can potentially impact soil vapor concentrations by displacing the soil vapor, diluting VOC concentrations locally, and/or creating a cap above the soil vapor. However, soil gas samples collected at depths of greater than three feet are unlikely to be significantly affected. *As a conservative measure, it is recommended to wait at least 48 hours after a significant rainfall (>1 inch) before proceeding with soil gas sampling.* The wait time prior to sampling will vary based on the soil type and associated soil drainage curves (refer to Appendix G of the California EPA *Advisory – Active Soil Gas Investigations*, dated April 2012). It is also recommended that irrigation, if applicable, be stopped at least 5 days prior to soil gas sampling.

The above environmental factors and other factors often contribute to seasonal or temporal variability in soil gas concentrations in the vadose zone. These variations are generally reduced when collecting soil gas samples from beneath existing impermeable surfaces such as garage floors, patios, parking lots, or roads, etc.

It is understood that project schedules for Terracon soil gas investigations conducted as part of due diligence may not allow for multiple sampling events to evaluate temporal variation. In these cases, the resulting data should be evaluated and qualified in the report with the understanding that fluctuations in concentrations could occur.

When the project schedule allows or when a more thorough evaluation of soil gas is warranted based on project objectives or sensitivity, two or more rounds (quarterly or semi-annual) of soil gas data should be collected. This will allow evaluation of temporal and seasonal variations at the site and other site-specific factors which may influence the migration of vapors. The maximum concentrations detected should be used to evaluate risk.

2.7 Evaluating Preferential Migration Pathways

Preferential pathways for vapor migration in the subsurface can be either natural or anthropogenic. Examples of preferential pathways include but are not limited to fractures, macropores, coarse-grained soils, gravel base for utility conduits, and subsurface drains.

A survey should be conducted to evaluate potential preferential vapor migration pathways. Underground utility lines can be important preferential migration pathways for vapors and can allow contaminants to migrate significant distances from source areas. The survey should evaluate underground utilities such as water, sewer, gas, electric, and telecommunication lines. Sources of information for the preferential pathway survey may include: site walkovers, geo-databases, construction blueprints, utility maps, Sanborn maps, historical aerial photos, interviews, utility companies, regulatory files, etc. Fill material and sand lenses or macropores in clay materials may also act as preferential pathways. Soil gas sampling locations should be scoped to assess possible preferential migration pathways.

3.0 SOIL GAS SAMPLING PROTOCOL

The following section provides basic guidelines and field procedures for conducting soil gas sampling using soil gas implants or post-run tubing (PRT) methods.

3.1 Soil Gas Implant Installation

Soil gas implants generally consist of a sampling point (stainless-steel, ceramic, or plastic) set at a specific depth within a borehole. This sampling point is connected to tubing that leads to a permanent or semi-permanent completion at the surface. The zone surrounding the sampling point is filled with sand and the remainder of the borehole is filled with hydrated bentonite with the option of grout for the surface completion. Refer to Figure 2 for a general schematic of a permanent soil gas implant. A field equipment/materials checklist, list of procedures, and field data form for this process are included in Appendix A. When installing soil gas implants in clayey soils, consider the potential for borehole smearing and utilize techniques to minimize or mitigate smearing. Contact a Vapor APR or Investigation/RBCA PRG member for advice on such techniques.

General installation procedures are as follows:

1) Advance the borehole to the desired depth using a selected standard drilling method (e.g., hand auger, direct-push, solid flight auger, or hollow stem auger);

2) Connect the sampling point to the sample tubing and lower the point to the desired sample depth;

3) Backfill the zone surrounding the sampling point (recommended 1 to 2 foot interval) with 20/40 grade silica sand;

4) Place at least 6 inches of dry, granular bentonite above the sand pack to prevent hydrated bentonite from infiltrating the sand pack;

5) Backfill the borehole with hydrated bentonite or bentonite grout (at least from near grade surface to 2-3 feet bgs recommended);

6) Construct a semi-permanent or permanent surface completion in accordance with state regulations for monitoring wells and sampling points and connect a shut-off valve to the end of the tubing; and

7) Collect soil gas samples in accordance with Section 3.3 of this guidance.

As depicted in Figure 2 (Page 13), soil gas implants can be installed at different depths within the same borehole to evaluate soil gas concentrations across the soil profile so long as hydrated bentonite seals are placed between the sanded intervals containing the sampling points. Consult with a member of the Vapor Encroachment/Intrusion Committee when using nested soil gas points/implants with multiple sampling depths.

Soil gas sampling points may also be installed using direct-push sampling equipment with expendable points and specialized tooling designed to deliver sampling points to the desired depth. Various subcontract and in-house drillers now have this tooling and are experienced with soil gas sampling point installation.

Method Pros:

- Can install nested points;
- Permanent or semi-permanent points allow for collection of additional samples for evaluation of temporal or seasonal variation;
- Can be done using hand auger equipment;
- Materials are relatively inexpensive; and
- Compatible with leak detection procedures (helium shroud and vacuum shut-in, see Section 5).

Method Cons:

- Requires longer equilibration time (48 hours is recommended) versus PRT method (2 hours recommended if project schedule allows, minimum wait time of 15 minutes); and
- IDW generated.

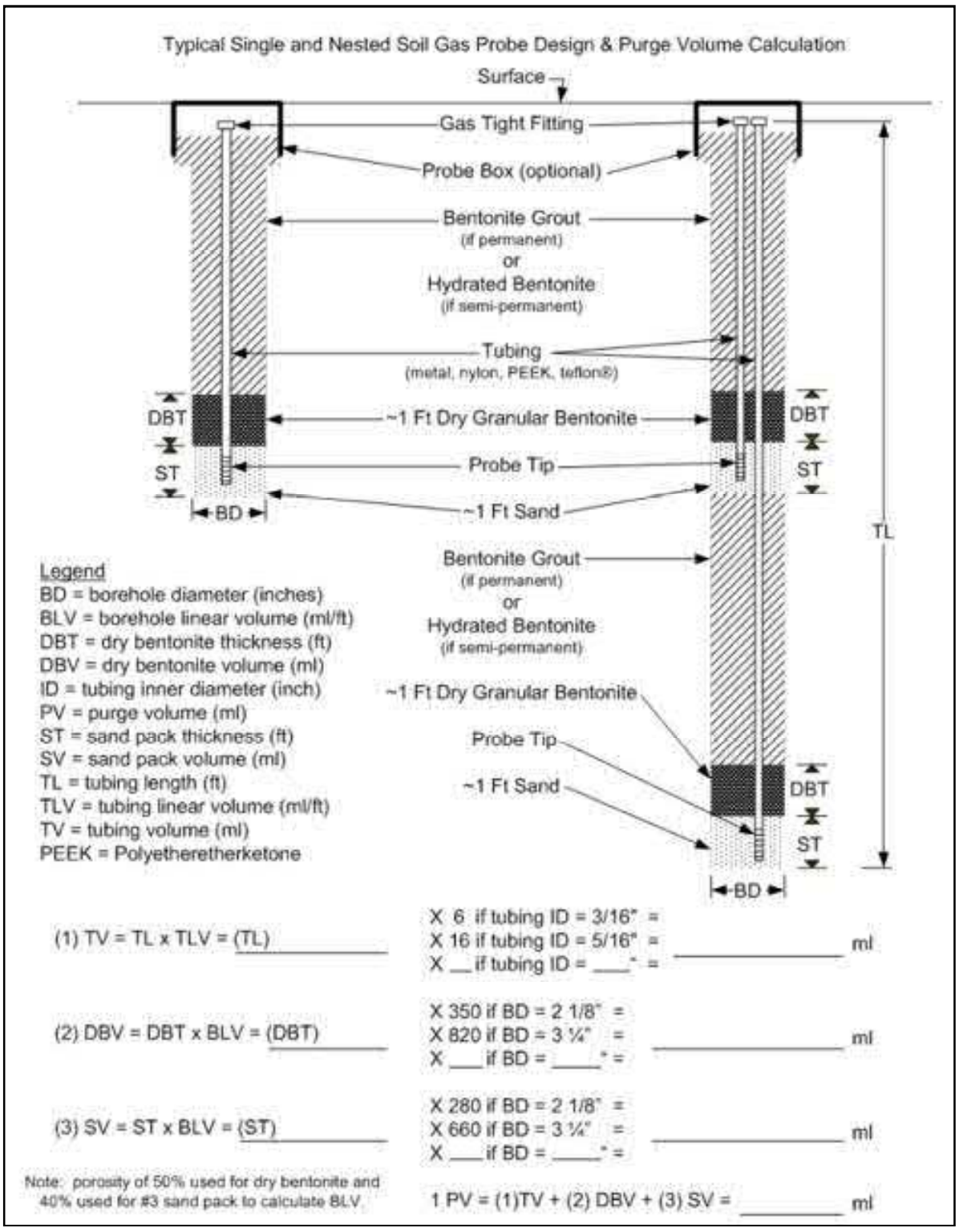

Figure 2: Typical Soil Gas Implant/Well Schematic (Source: Cal EPA, *Advisory - Active Soil Gas Investigations*, April 2012)

If the project schedule does not allow the recommended 48 hours for probe equilibration, an alternative approach is to develop the soil gas probe by purging a minimum of three dead volumes of the probe, including the sand pack and dry granular bentonite layer, and the associated sampling train (refer to Section 3.3 for details on purging and dead volumes).

3.2 Post-Run Tubing (PRT) Method

The PRT method allows for collection of soil gas samples from temporary sampling points installed using direct-push tooling while the tooling remains in the ground. Various subcontract and in-house drillers now have this tooling and are generally experienced with the PRT sampling method. A field equipment/materials checklist, list of procedures, and field data form for this process are included in Appendix B.

General installation procedures are as follows:

1) Install O-rings on the PRT expendable point holder and the PRT adapter;

2) Drive the PRT rod configuration into the ground, connecting probe rods as necessary to reach the desired depth. After desired depth has been achieved, disengage the expendable drive point;

3) Retract the rods approximately 4 to 6 inches up to create a void from which to sample the soil gas;

4) Insert the PRT adapter end of the tubing down the inside diameter of the probe rods. Feed the tubing down the rod bore until it hits bottom on the expendable point holder. Allow approximately 4 to 6 ft. of tubing to extend out of the top of the probe rods before cutting it;

5) Grasp the excess tubing end and apply some downward pressure while turning it in a counter-clockwise motion to engage the adapter threads with the expendable point holder. Continue turning until the PRT adapter O-ring bottoms out in the expendable point holder;

6) Pull up lightly on the tubing to test the engagement of the threads. Failure of the PRT adapter to thread could mean that intrusion of soil may have occurred during driving of the rods or disengagement of the expendable drive point;

7) Apply a hydrated bentonite or grout seal at the surface around the probe rod where it enters the ground;

8) Connect the end of the tubing to the sampling train and collect soil gas samples as outlined in Section 3.3 of this guidance; and

9) After sample collection, remove the direct-push drive rods and plug the borehole in accordance with applicable regulations.

It should be noted that select drillers have modified setups that allow attachment of the tubing to the terminal drive rod prior to advancement. This method is preferred if available in your area.

Method Pros:

- Relatively quick procedure, generally limited by time for actual sample collection;
- Less equilibration time required (2 hours recommended if project schedule allows, minimum wait time of 15 minutes) versus permanent soil gas implants (48 hours recommended);
- No return trips to site required for sampling or borehole plugging; and
- No soil IDW generated.

Method Cons:

- Not easily compatible with tracer-based leak detection (e.g., helium-filled shroud);
- Does not allow for return trips for re-sampling or multiple sampling events to evaluate temporal or seasonal variation;
- Does not allow for multiple sampling depths from same borehole;
- Engagement of tubing and associated PRT fitting down-hole inside the drive rods by twisting tubing to engage threads and O-rings is cumbersome, and proper evaluation of an air-tight O-ring seal is not possible; and
- Various method deficiencies are documented in the April 2012 California EPA Active Soil Gas Investigations Advisory, including incompatibility with leak testing and concerns over a proper air-tight seal of the PRT fitting.

Although the PRT method is widely-utilized in the industry, select jurisdictions (namely California) have concerns over its use. If your project includes leak detection testing or is a sensitive project requiring a high level of confidence and QA/QC, the installation of a permanent or semi-permanent soil gas sampling point with soil gas implants is recommended.

3.3 Sample Collection and Handling

The following section discusses the recommended soil gas sample collection procedures for both soil gas implants and PRT-method points. State-specific sampling requirements supersede this sampling guidance and should be utilized when applicable.

Step 1: Setting up the Sampling Train

Sampling trains can be setup in various ways but generally include the following items:

- Sample tubing (Teflon®, Teflon®-lined, PEEK, or Nylaflow® are recommended);
- Ball valves, fittings, and T-connectors;
- Purge pump (e.g., air sampling pump or peristaltic pump);
- PID to measure total VOCs; and
- Summa canister with dedicated low-flow (<200 ml/min) regulator.

The exact setup is up to the user, but it should utilize one or more of the recommended tubing options mentioned above and the tubing and fitting connections should be air-tight. The tubing and fittings utilized should also be dedicated and not re-used from one sample location to the other. If brass or machined fittings or valves are utilized, be aware that residual cutting oils from the manufacturing of these items may provide a source of cross contamination. If such fittings or valves are utilized, they should be properly decontaminated prior to use and a field/materials blank should be collected as discussed in Section 5.4 of this guidance.

T-connectors and ball valves are commonly utilized to allow access to the purge pump and/or PID meter during sample purging. These valves are then closed to isolate these instruments from the sampling train before opening the Summa canister and collecting the sample.

The use of polyethylene tubing commonly used for low-flow groundwater sample collection or vinyl tubing is discouraged because research shows this tubing can absorb and release COCs, leading to possible sample bias and/or cross-contamination.

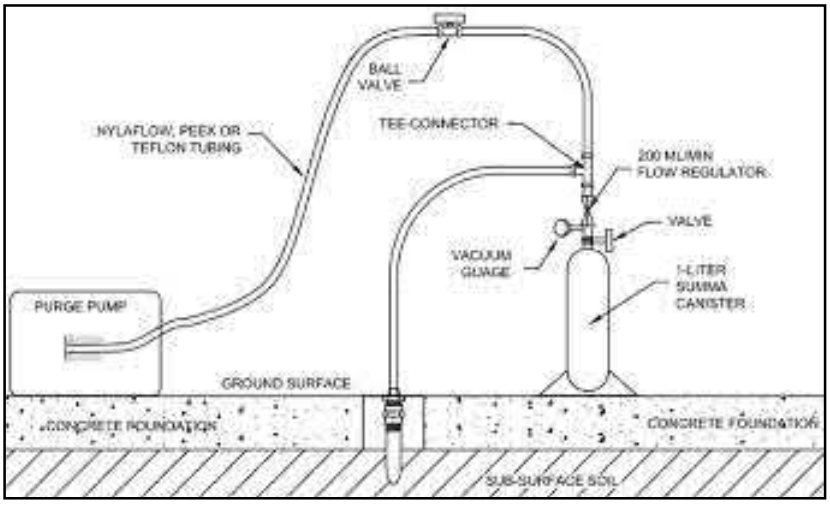

Figure 3: Example Sampling Train and Subslab Probe

Step 2: Sample Purging

Prior to sample collection, the soil gas sampling point and sampling train should be purged to remove "dead air" and ensure a representative soil gas sample is collected. This purging can be done with a standard air sampling pump, peristaltic pump, or PID meter. The purging should be conducted at a low-flow rate (<200 ml/min) and the vacuum applied should not exceed 100 inches of water. As a general rule of thumb, three sample train or system volumes (i.e., dead volumes) should be purged prior to sample collection. The dead volume equals the aggregate volume of all tubing, fittings, ports, and sanded and dry granular bentonite subsurface zones surrounding soil gas implants at a given location. If utilizing a PID to purge, check the flow rate of the model to ensure that it is <200ml/min or utilize a flow regulator to adjust to a low-flow rate.

For sensitive sites or where a higher degree of certainty is desired it is recommended to conduct a purge test (until vacuum, flow rate, and PID readings stabilize) on a representative sampling point in order to determine the optimal purge volume for the location. Purge tests should be conducted for each general soil type at the site. The resulting purge volume should then be applied consistently for all samples collected from the respective soil type in the study area. During the purge test, the vacuum and flow rate should be limited as noted above. This should limit the potential for ambient air being drawn into the sample from the ground surface and it should limit desorbing of vapors from contaminated soils.

Care should be taken to only purge the amount of soil gas necessary to appropriately remove the dead volume and obtain a representative sample when exterior shallow soil gas samples are being collected. Large purge volumes could result in atmospheric air being drawn into the vadose zone and diluting the soil gas sample.

Low permeability soils can pose challenges due to the restriction of adequate soil gas flow during purging and sample collection. Measures to aid in sample collection for low permeability soils can include reducing flow rates for sample collection, increasing sample collection times, and/or increasing the size of the sand pack surrounding the sampling tip. Refer to Appendix D of the California EPA *Advisory – Active Soil Gas Investigations*, dated April 2012, for alternative methods for low permeability soils.

Step 3: Sample Collection

After purging of three system/sampling train dead volumes or the optimal purge volume derived from the purge test, the valves leading to the pump and/or PID should be closed and the pump or PID turned off. After this, sample collection is simply initiated by opening the Summa canister already connected to the sampling train that is filled with representative soil gas. The Summa canister should be equipped with a laboratory-supplied, dedicated flow regulator set to a flow of <200 ml/min.

It is important that the canister vacuum is recorded: 1) immediately upon opening the canister and initiating sample collection; 2) at the end of sample collection prior to closing the canister; and 3) by the laboratory upon receipt of the sample at the laboratory and prior to sample analysis.

Sample collection is complete when the vacuum on the summa canister reaches near zero. It is preferred to leave some vacuum (e.g., 2 to 3 inches Hg or other as indicated by laboratory) in the Summa canister after sample collection so that a comparison with the vacuum measured prior to analysis at the laboratory can identify possible canister leaks during sample shipment. Then, the Summa canister valve should be closed prior to disassembling the sample train. If the site geology and/or time allowed for the investigation does not allow for complete filling of the Summa canister (i.e., vacuum reading near zero), contact the laboratory and report the observed vacuum reading prior to closing the Summa canister to see if they will have sufficient volume to reach the desired reporting limits to compare to applicable standards or screening values. If the reporting limits will not meet the needs of the project, consult the laboratory and APR for options on evaluating the resulting qualified data. Recording the sampling duration time is also useful in that it can be evaluated against the regulator flow rate to approximate the sample volume collected.

As previously mentioned, Summa canisters not exhibiting full vacuum when they are first opened should not be utilized since ambient air may have entered the canister during shipment. Differences in canister vacuum can also result from the shipping of canisters between locations with different elevations. If you have questions or concerns about the initial vacuum in your summa canister, contact the laboratory to discuss the vacuum that was recorded at the lab prior to canister shipment and to evaluate any discrepancies in vacuum.

The use of Tedlar® bags for soil gas sample collection is discouraged due to limited hold times and research showing the loss via breakthrough and/or absorption of COCs.

Step 4: Sample Packaging/Shipment

Soil gas samples are shipped back to the laboratory in closed Summa canisters in the originally-supplied box and packaging along with a properly-completed chain-of-custody. Soil gas samples should not be chilled or shipped in a cooler. Although sample collection in Tedlar® bags is discouraged by this guidance, if Tedlar® bags are utilized, they should be stored and shipped in a manner avoiding contact with direct sunlight.

Data Collection

There are various data that need to be recorded during soil gas sample collection. Refer to the field data forms in Appendices A through C for templates outlining the various data and parameters that should be collected in connection with the investigation methods discussed in this guidance.

A useful tool in the field during soil gas sample collection is a portable methane gas meter capable of measuring percent concentrations of methane, oxygen, and carbon dioxide. Readings of these parameters from a soil gas sampling point during purging can provide useful information regarding: 1) stabilization during a purge test; 2) subsurface oxygen concentrations and the potential for bioattenuation in the subsurface; and 3) whether methane is present in the subsurface at concentrations of potential concern (methane lower explosive limit equals 5% by volume).

4.0 SUBSLAB SOIL GAS SAMPLING PROTOCOL

Subslab soil gas data from samples collected under the building slab and within the advective envelope of the building-driven pressurization or depressurization indicates whether contaminants have accumulated directly under the building. This is the preferred method for soil gas evaluation for sites with existing buildings with foundations above the water table. Analytical detection limits should be low enough to effectively evaluate the indoor air risk using the industry-accepted, conservative default attenuation factor of 0.1 for subslab soil gas to indoor air (i.e., 10% of the subslab contaminant vapors assumed to enter the building via cracks or penetrations)

Subslab soil gas sampling may shorten the time needed to evaluate the vapor intrusion exposure pathway and may help reduce the overall cost of a vapor intrusion evaluation. When proceeding directly to subslab soil gas sampling, characterization of the subsurface soil gas around the building, determination of the physical character of the vadose zone, and site-specific vapor intrusion modeling may not be needed. However, the collection of subslab soil gas samples can be inconvenient to building occupants since it requires the removal of floor coverings and coring or drilling of the building slab.

Important items to note:

- During subslab soil gas sampling, be careful not to damage the integrity of the slab. Subslab utilities, post-tension cables, and other slab features such as radiant-heat systems should be located prior to selecting sampling locations. Blueprints and ground-penetrating radar (GPR) or x-ray studies can assist in locating these features.
- Since penetrating the slab creates a preferential pathway, proper sealing of the sampling port after sample collection is essential to avoid leaks.
- Subslab soil gas sampling should be avoided in areas where groundwater might intersect the slab.

The number, type (time-integrated or grab samples), and locations of subslab soil gas samples should be determined based on information collected during the building survey, an understanding of the building foundation, and the results from nearby soil gas sampling, if available. Sample locations should be selected taking source areas, maximum groundwater concentrations, areas with the highest likelihood of impact, and preferential pathways into account. Subslab samples collected near building edges can

show higher variability and may not represent the composition of soil gas under the interior of the slab. For this reason, it is recommended to locate subslab soil gas sampling locations away from building edges when possible and to have at least some of the samples collected from the center of the building footprint.

For foundations up to 5,000 square feet, at least three subslab soil gas samples should be collected taking into account the nearest source area and possible preferential migration pathways. The sampling frequency benchmark for buildings greater than 5,000 square feet in area is one subslab soil gas sample per additional 2,000 square feet of building area for building up to 15,000 square feet in area. If a lesser frequency of subslab soil gas samples for buildings less than 15,000 square feet is warranted based on client objectives, client budget, project objectives, or site access, contact one of the vapor intrusion contacts listed in Section 1.3 for assistance with determining the adequate number of samples and their optimal locations.

For foundations greater than 15,000 square feet, the adequate number of samples should be determined on a site-specific basis taking source areas, maximum groundwater concentrations, areas with the highest likelihood of impact, and preferential pathways into account.. Involve one of the vapor intrusion contacts listed in Section 1.3 for assistance with determining adequate sample numbers and locations.

4.1 Subslab Soil Gas Sampling Probe Installation

First, ensure that the appropriate subsurface utility locates have been conducted and that private on-site utilities within the building have been located. Also review building plans and correspond with property management to ensure that post-tension cables and other foundation features such as radiant-heat systems, if present, will not be damaged.

A field equipment/materials checklist, list of procedures, and field data form for this process are included in Appendix C.

4.1.1 Subslab Soil Gas Sampling Using Vapor Pin

Cox-Colvin & Associates, Inc.'s Vapor Pin™ technology (http://www.coxcolvin.com/VaporPin.php) are pre-assembled sub-slab probes offered in stainless-steel and brass (Figure 4), and include silicon sleeves that create a seal between the probe and the hole drilled in the concrete. They are easier to install and extract than conventional sub-slab probes and eliminate the need for grouting. Product details, installation procedures, and an installation video are located on the above-listed website. If Vapor Pins™ are utilized, leak detection using a tracer gas is recommended. Utilize the following protocol as a guide for subslab soil gas sampling installation using Vapor Pins™.

A copy of Cox-Colvin & Associates, Inc.'s Standard Operating Procedure for Installation and Extraction of the Vapor Pin is included in Appendix C.

Installation Procedure:

1) Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.

2) Set up wet/dry vacuum to collect drill cuttings.

3) If a flush mount installation is required, drill a 1½-inch diameter hole at least 1¾-inches into the slab.

4) Drill a 5/8-inch diameter hole through the slab and approximately 1-inch into the underlying soil to form a void.

5) Remove the drill bit, brush the hole with the bottle brush, and remove the loose cuttings with the vacuum.

6) Place the lower end of Vapor Pin™ assembly into the drilled hole. Place the small hole located in the handle of the extraction/installation tool over the Vapor Pin™ to protect the barb fitting and cap, and tap the Vapor Pin™ into place using a dead blow hammer (Figure 5). Make sure the extraction/installation tool is aligned parallel to the Vapor Pin™ to avoid damaging the barb fitting.

   For flush mount installations (Figure 6), unscrew the threaded coupling from the installation/extraction handle and use the hole in the end of the tool to assist with the installation.

7) During installation, the silicone sleeve will form a slight bulge between the slab and the Vapor Pin™ shoulder. Place the protective cap on Vapor Pin™ to prevent vapor loss prior to sampling (Figure 7).

Figure 4: Assembled Vapor Pin™

Figure 5: Installing the Vapor Pin™

Figure 6: Flush-Mount Installation

Figure 7: Installed Vapor Pin™

8) For flush mount installations, cover the Vapor Pin™ with a flush mount cover.

9) Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil-gas conditions to equilibrate prior to sampling.

10) Remove protective cap and connect sample tubing to the barb fitting of the Vapor Pin™ (Figure 8).

11) Conduct leak tests (e.g., real-time monitoring of oxygen levels on extracted sub-slab soil gas, placement of a water dam around the Vapor Pin™ (Figure 9), or tracer gas leak testing within a shroud). Consult your local guidance for appropriate tests.

12) Collect sub-slab soil gas sample. When finished sampling, replace the protective cap and flush mount cover until the next sampling event. If the sampling is complete, extract the Vapor Pin™.

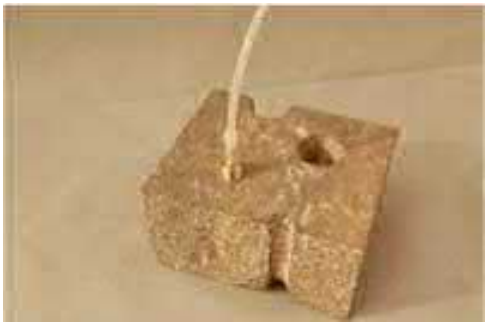

Figure 8: Vapor Pin™ Sample Connection

Figure 9: Water Dam Used for Leak Detection

Extraction Procedure:

1) Remove the protective cap, and thread the installation/extraction tool onto the barrel of the Vapor Pin™ (Figure 10). Continue turning the tool to assist in extraction, then pull the Vapor Pin™ from the hole (Figure 11).

2) Fill the void with hydraulic cement and smooth with the trowel or putty knife.

3) Prior to reuse, remove the silicone sleeve and discard. Decontaminate the Vapor Pin™ in a hot water and Alconox® wash, then heat in an oven to a temperature of 130° C.

Figure 10: Removing the Vapor Pin™

The Vapor Pin™ to designed be used repeatedly; however, replacement parts and supplies will be required periodically. These parts are available on-line at www.CoxColvin.com. If Vapor Pins™ are re-used, it is recommended that the silicon seals be replaced prior to re-use.

Figure 11: Extracted Vapor Pin™

4.1.2 Subslab Soil Gas Sampling Using Conventional Ports

Utilize the following protocol as a guide for subslab soil gas sampling port installation.

1) Drill a ⅜"-diameter pilot hole approximately 2 inches in depth.

2) Using the ⅜" pilot hole as your center, drill a 1"-diameter outer hole to a depth of approximately 1 ⅜". Vacuum any cuttings out of the hole.

3) Continue drilling the ⅜" inner or pilot hole through the slab and a few inches into the subslab material. While drilling, carefully vacuum out any cuttings from the outer hole.

4) Determine the length of stainless-steel tubing required to reach from the bottom of the outer hole, through the slab and into the open cavity below the slab. To avoid obstruction of the probe tube, ensure that it does not contact the subslab material. Using a tube cutter, cut the tubing to the desired length.

5) Attach a measured length (typically 3"-4") of ¼" OD stainless tubing to the female connector with a Swagelok® nut. Make sure that the tubing rests firmly in the fitting body and that the nut is finger tight. While holding the fitting body firmly, tighten the nut 1¼ turns.

6) Insert the ¼" hex socket plug into the female connector. If using a stainless steel socket plug, wrap one layer of Teflon® thread tape around the threads to prevent binding. If using a brass socket plug, no Teflon® tape is needed. Tighten the plug slightly. Do not over tighten. If excessive force is required to remove the plug during the sample set up phase, the probe may break loose from the anchoring cement.

7) Place the completed probe into the outer hole to check fit and to ensure that stainless steel tubing is not in contact with the subslab material. Make necessary adjustments to the hole or probe assembly.

8) In a disposable cup or other container, mix a small amount of the anchoring cement or grout. Add water sparingly to create a mixture that is fairly stiff and moldable. Place a spoonful or two of the cement/grout around the stainless steel tubing adjacent to the female connector nut. Mold the cement/grout into a mass around the connector nut and up around the main body of the probe assembly. Slide the Teflon® washer onto the stainless steel tube so that it rests next to the cement/grout mixture. The washer will prevent any anchoring cement/grout from flowing into the inner hole during the final step of probe installation.

9) Carefully place the probe assembly into the drilled hole, applying light pressure to seat the assembly. While inserting the probe assembly, work the concrete/grout mixture to fill voids. Clean up cement/grout that discharged out of the hole during placement; avoid getting any of the

concrete/grout into fittings or on fitting threads. Allow the cement/grout to cure according to manufacturer's instructions before sampling.

The bottom end of the stainless steel tubing should terminate within the slab (i.e., "float" within slab) and shall not extend into the subslab material. Refer to Figure 12 for a general schematic of a subslab soil gas sampling probe.

Ensure that a threaded, air-tight cap is placed on the soil gas sampling probe when purging/sampling is not being conducted to ensure that the probe is not serving as a preferential pathway for migration of vapors to indoor air.

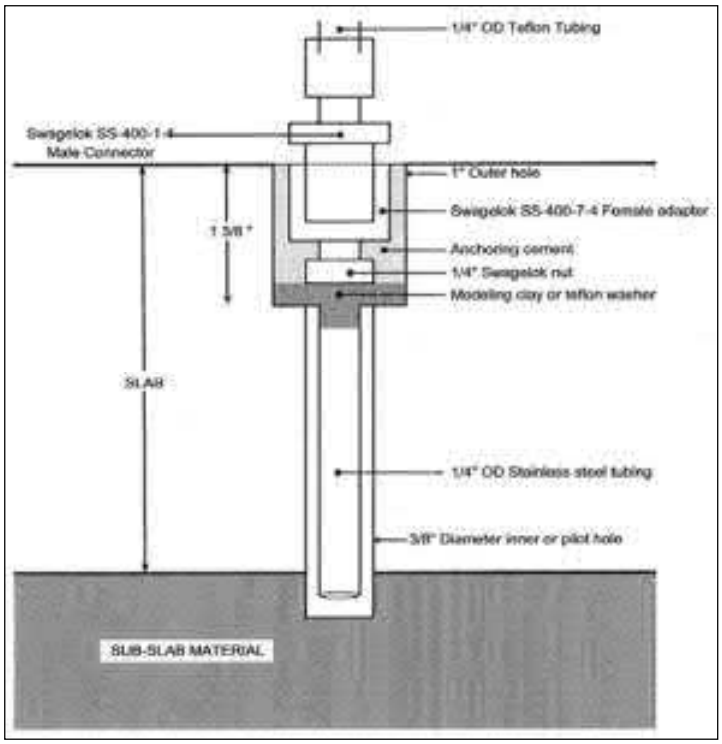

Figure 12: Subslab Sampling Probe (Source: Ohio EPA, *Sample Collection and Evaluation of Vapor Intusion to Indoor Air*, May 2010)

The probe materials may vary depending on the user, but generally consist of stainless-steel tubing and Swagelock ® couplers and fittings. Suggested materials lists are included in Appendix C. GC-grade stainless steel tubing and fittings are recommended for use on sensitive sites. If standard stainless steel or machined brass materials are utilized, ensure that they are properly decontaminated prior to sampling and collect a materials blank as outlined in Section 5.4 of this guidance.

4.2 Subslab Soil Gas Sample Collection

It is recommended that subslab soil gas probes be allowed to equilibrate for 24 hours prior to sample collection. If the project schedule does not allow a 24-hour equilibration time, the probes should be purged at a low-flow rate to promote collection of representative samples. If this approach is required, contact one of the vapor intrusion contacts in Section 1.3 to discuss the site-specific conditions and determine an adequate purge volume. For sites with elevated VOCs in the subslab, a PID can also be utilized during purging to evaluate equilibration for representative sample collection. Subslab soil gas sample collection procedures are the same as soil gas sample collection. Refer to Section 3.3 of this guidance.

In addition to soil gas sample collection, note that subslab sampling ports can also be utilized to obtain data on air pressures in the subslab for comparison to indoor air pressures to determine the pressure gradient across the slab. These probes can also be utilized to measure vacuum and flow rate beneath the slab during diagnostic testing conducted prior to the design of a mitigation system.

5.0 LEAK DETECTION AND QA/QC

The following section discusses leak-detection options for soil gas sampling. It is recommended that some form of leak detection be employed during Terracon soil gas investigations. The degree of leak detection will depend on the project objectives, jurisdiction where the sampling is conducted, and sensitivity of the project. The collection of field and materials blanks is also discussed in this section.

5.1 Tracer Testing of Sampling Probe

Tracer tests of the sampling probe are performed to document that the seal(s) between the surface and the soil gas sampling location or the sampling apparatus are not allowing ambient air into the sample. A variety of materials can be used as a tracer. Two of the most common are isopropyl alcohol and helium gas. Note that some states require the use of laboratory-grade helium, which can be difficult to acquire. Check with your regulatory agency to ensure the appropriate tracer gas is used.

A common apparatus for performing a gas tracer test consists of a 5-gallon bucket or similar plastic container placed over the probe-rod assembly or sample port to control wind drift and concentrate the tracer gas (refer to Figure 13). The tracer gas is then introduced into the bucket or container via a bottle of compressed gas resulting in a shroud concentration of approximately two orders of magnitude higher than the reporting limit of the field monitoring meter or analytical method used to analyze the sample.

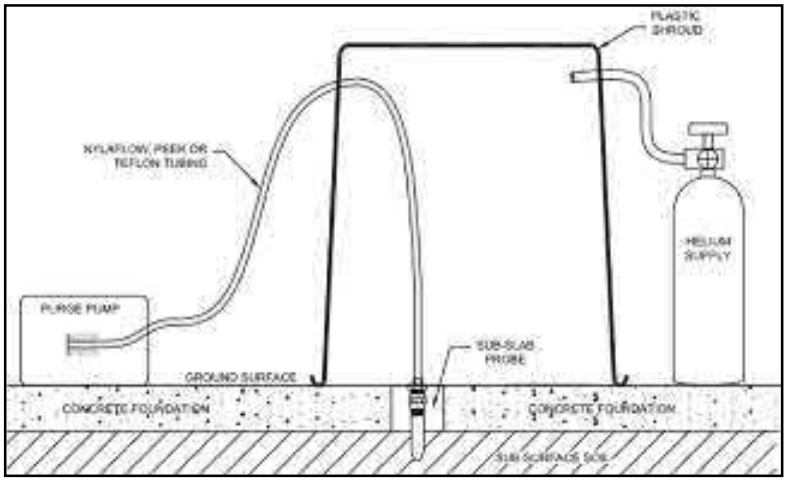

Figure 13: Simple Tracer Shroud

It is recommended that the tracer gas within the shroud be kept within ± 10% of its target value. The tracer gas concentration is measured both in the shroud and in the soil gas removed during sampling train purging using a field monitoring meter. The field monitoring meter or analytical method (if

samples are submitted for laboratory analysis) should be capable of measuring the tracer compound in air to an accuracy of 0.1 percent. For helium tracer gas, the MGD-2002 leak detector or equivalent is recommended.

The concentration of tracer gas measured from the sampling train should read less than 5% of the minimum shroud concentration. If the tracer gas measurement is greater than 5% of the minimum shroud concentration, the sample train should be inspected for leaks and re-tested.

In addition to measuring tracer gas using a field monitor, the tracer gas concentration in the collected air samples can be analyzed by the lab to see if elevated levels of tracer gas entered the samples. Some jurisdictions may require analytical testing of tracer gas; refer to your state-specific guidance. It should be noted that this simple tracer gas method for the sampling probe does not account for potential leaks associated with tubing and connections of the sampling train.

5.2 Tracer Testing of Sampling Probe and Sampling Train

One option for tracer testing for leak detection is the use a shroud covering both the soil gas sampling probe and the entire sampling train (i.e., Summa canister, associated gauges and regulators, tubing connections, and valves). An example setup is shown in Figure 14. This method is the most-complete tracer testing method in that all potential sources of leaks in the sampling train and the sampling probe are accounted for. The most common tracer gas is helium based on its availability and ease of monitoring in the field with readily-available field monitors.

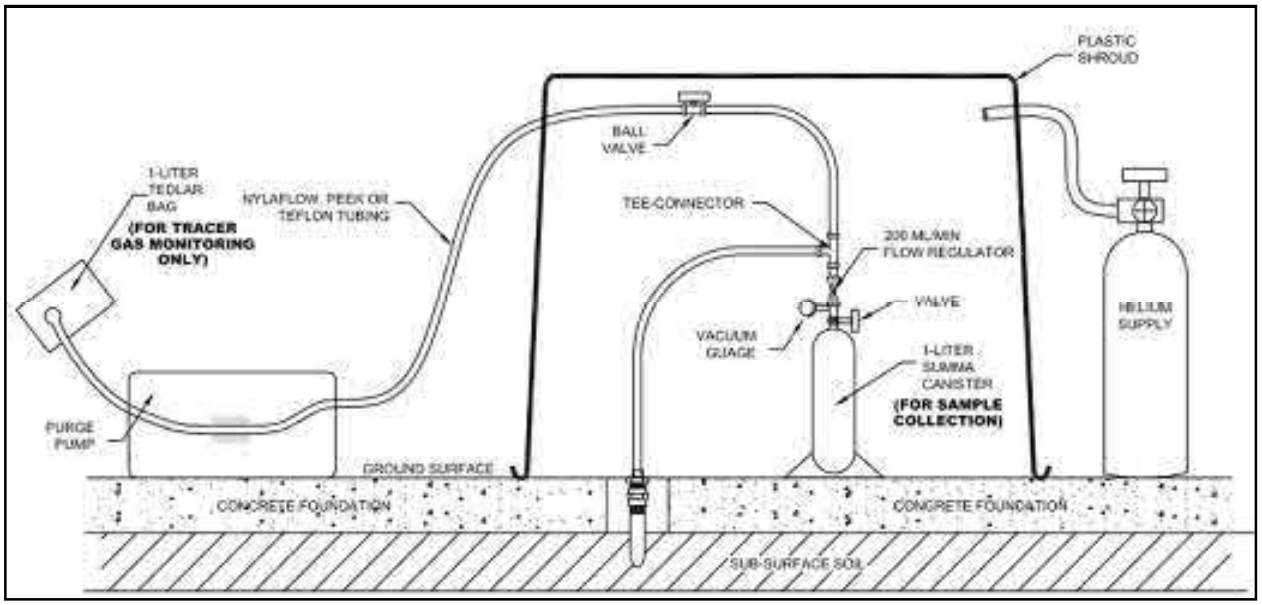

Figure 14: Tracer Shroud for Sampling Train and Probe

Tracer gas is introduced into the shroud (clear plastic container works best so the sampling train can be viewed) and maintained at a concentration of ± 10% of its target value (refer to Section 5.1). The sampling train and probe are then purged using a peristaltic pump or other pump and the tracer gas concentration of the purged soil gas is monitored using the field monitoring meter. The monitoring consists of filling a 1-L Tedlar® bag with the purged soil gas and measuring for tracer gas using the field monitor. This process is repeated two additional times to yield three consecutive tests (3 liters total purge volume) for tracer gas.

If the detected tracer gas concentration in the purged soil gas is 5% or less of the minimum tracer gas concentration in the shroud during three consecutive tests, sampling may proceed. If tracer gas is detected in the purged soil gas at concentrations greater than 5% of the minimum tracer gas concentration detected in the shroud, the probe and sampling train should be examined for potential leaks and the tracer test re-conducted.

5.3 Vacuum Shut-In Testing

Shut-in testing is a simple technique used in the field to evaluate the integrity of the sample train. A typical shut-in test involves closing the valve to the vapor probe and evacuating the sample train (all associated tubing hooked up to the Summa canister) to a measured vacuum. The vacuum should be a minimum of approximately 100 inches of water. Then, the vacuum is shut in by closing the valve at the opposite end of the sampling train near the pump pulling the vacuum. This vacuum is monitored using an in-line vacuum gauge. The initial measured vacuum should be maintained for 30 seconds for a positive shut-in test. If the vacuum dissipates from the sample train, the shut-in test has failed, and all connections should be inspected for leaks prior to proceeding with sampling. It should be noted that the major limitation of the vacuum shut-in test is that it does not allow leak testing of the soil gas probe.

5.4 Field and Materials Blanks

A field blank can provide information on possible cross-contamination from ambient air, while a materials blank can provide information on possible cross contamination from the tubing and fittings stock used for probe construction and in the sampling train. Collection of both types of blanks is recommended on soil gas investigations for QA/QC purposes.

Field Blank

The field blank should be collected by placing a Summa canister and dedicated flow regulator in a location on the site consistent with the soil gas sampling probes. The sample should be collected at some time during soil gas sample collection, preferably at a time of day when background sources of VOCs in ambient air (e.g., vehicle exhaust, industrial emissions, etc.) are expected to be the highest. Collect the sample by opening the Summa canister (similar procedures as discussed in Section 3.3).

When collecting a field blank for interior sub-slab samples, be aware that the most-representative ambient air blank is actually indoor air and the reported data would potentially need to be addressed as appropriate. If indoor air sampling has not been authorized by the client, an indoor ambient field blank should not be collected in conjunction with sub-slab soil gas sampling.

Materials Blank

The materials blank is collected by connecting a canister of commercially-available, certified-zero air calibration gas (such as that used for zero calibration of PID instruments) to the Summa canister via the same probe and sampling train materials utilized for the soil gas probes. The zero air is then drawn through the sampling train during collection into the Summa canister. Collection of a materials blank is particularly important if using brass or other machined tubing or fittings that may lead to cross contamination from residual cutting oils and cleaning agents.

APPENDIX A

Soil Gas Implant Method: Equipment/Materials List, Procedures, and Field Data Form

Soil Gas Implant – Suggested Equipment

The below is a list of suggested equipment for soil gas implants/wells. Various alternatives exist for the screened sampling tips that are employed in the subsurface to collect soil gas. All sampling train components (e.g., sampling tips, tubing, valves, fittings, etc.) should be dedicated or properly decontaminated between sampling locations.

Soil Gas Implant Installation

- Level D or Applicable PPE
- Stainless-Steel Hand Auger (if not using drilling rig)
- Standard Decontamination Equipment
- Soil Gas Implants/Screened Sampling Tips (some options below)
    - EON Products, Inc. Soil Gas Vapor Point with Umbrella (Cat. Number SVP-200)
    - EON Soil Gas Vapor Screen (Cat. Number SVP-201)
    - Environmental Service Products (ESP) SKU# SVPT91
    - Environmental Service Products (ESP) SKU# SVPT92
- Tubing (1/4" OD): Teflon®, Teflon®-Lined, Nylaflow, or PEEK
- Plastic or Stainless-Steel Valve to Close Off Tubing at Surface Completion
- Washed and Cleaned Fine-Grained Sand
- Dry Coarse or Granular Bentonite
- Bentonite Grout (5% Bentonite / 95% Portland Cement)
- Well Vault or Cover for Surface Completion
- Portland Cement

Sampling Train and Sampling Equipment

- Sample Tubing (1/4" OD): Teflon®, Teflon®-Lined, Nylaflow, or PEEK
- Connection/Utility Tubing (3/8" OD): Silicone
- Fittings/Valves: Stainless-Steel and/or Plastic; Ball Valves, 3-Way Valves, Tee Connectors, and/or Couplers (will vary based on user preference and compatibility with laboratory-supplied flow regulators and sampling trains)
- Summa Canister Equipped with Low-Flow Regulator (i.e., <200ml/min)
- Purge Pump: Peristaltic Pump, Lung Box, or Indoor Air Sampling Pump
- Graduated Syringe (alternative to pump for purging)
- Vacuum Gauge (if conducting vacuum shut-in test on sampling train)
- Tedlar® Bags (to monitor soil gas with PID, etc. – not for sample collection)
- Photoionization Detector (PID) Equipped with Appropriate Lamp
- Landfill Gas or Multi-Gas Meter (CH_4, CO_2, O_2, Balance Gas)

Soil Gas Implant Procedures

1. Use a hand auger, geoprobe, or hollow stem auger to advance a soil boring to the desired depth. Photoionization detector (PID) readings may be collected to assist in determining the sampling interval(s).

2. Determine the length of tubing (Teflon®-lined, PEEK, or Nylaflow tubing recommended) required to reach from the bottom of the borehole. Connect a soil gas sampling screen to the bottom of the tubing, cut the tubing to the desired length, and insert the screen to a depth of approximately 6-inches above the bottom of the borehole.

3. Fill the boring with 20/40 grade silica sand to a minimum of 6 inches above and below the sampling screen elevation.

4. Place at least 6 inches of dry, granular bentonite above the sand pack to prevent hydrated bentonite from infiltrating the sand pack.

5. Seal the remainder of the boring with hydrated bentonite or bentonite grout. Surface completion may be constructed if a permanent well point is being installed.

6. Allow the soil gas implant/well to equilibrate for a minimum of 48 hours prior to purging or sampling.

7. Attach the sample tubing to the associated valves and sample container (i.e., Summa canister) to construct the sampling train. The exact sampling train setup may vary depending on user preferences but typically involves the use of a three-way valve or a tee-connector and valves to allow the user to switch flow between tubing leading to the purge pump and tubing leading to the Summa canister while not allowing ambient air to backflow into the system. Refer to Step 1 in Section 3.3 of guidance document and Figure 5 of guidance document.

8. Open the valve to the vacuum pump and purge a minimum three system volumes (i.e., pore space of the sand pack and dry granular bentonite, and the volume of all tubing and fittings within the sampling train). Conduct leak detection during purging as applicable (Refer to Section 5 of guidance document).

9. After purging, turn the three-way valve or associated valves to close off the purge tubing from the sampling train while allowing the sample tubing to remain connected to the Summa canister and filled with representative soil gas.

10. Collect soil gas samples as outlined in Section 3.3 of the guidance document.

11. After sample collection, plug and abandon semi-permanent soil gas implants/wells in accordance with applicable regulations.

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FIELD DATA FORM: SOIL GAS IMPLANT METHOD

PROJECT NAME: _____ Sample ID: _____

PROJECT NO.: _____ Sample Date: _____

Temperature: _____ ^{0}F / ^{0}C Barometric Pressure: _____ "Hg*

Has there been significant rain or snow recent to the sampling event? Yes No

If Yes to above question; Date(s) _____ Amount * _____ in. *(www.localconditions.com)

Location Description: _____ Surface Cover: _____

Subsurface Utilities and distance from probe: _____

Potential VOC sources in the vicinity? _____ Distance from probe: _____ ft.

Gas Probe / Implant Details

Soil Gas Probe / Implant Installation Method: _____

Sample Zone Soil Type: (circle one): clay silt sand gravel other: _____

Apparent Moisture Content of Sampling Zone (circle one): dry moist wet (do not sample if saturated)

Borehole Diameter (in.) _____ Borehole Depth (ft.) _____

Implant Depth (ft.) _____ Note: For nested points, add probe details in Comments section, below.

Sand Interval: _____ to _____ ft. Bentonite/Grout: _____ to _____ ft.

Water Source for bentonite hydration: _____ Deionized? yes no

Surface Completion / Protection: _____

Sample Purging

Equlibration time between probe installation and purging: _____ hours/days (48 hours recommended)

Sandpack/Granular Bentonite Pore Volume: _____ ml

Tubing Type: _____ Tubing Length: _____ ft. Tubing Diameter: _____ inch

Purging Method: _____ Pump Rate: _____ ml / min. Purging Duration: _____ min.

Volume Purged: _____ ml (Refer to Table 2 on page 13 of guidance for assistance with calculating volume purged)

PID / FID at Initial Purge: _____ ppm PID / FID at Sample Collection: _____ ppm

Leak Test Prior to Sample Collection? Yes No Method _____

Helium Tracer Test Tracer Compound: _____ Instrument: _____

Tracer Concentration, Test 1 Shroud _____ ppm/% Probe _____ ppm/%

Tracer Concentration, Test 2 Shroud _____ ppm/% Probe _____ ppm/%

Tracer Concentration, Test 3 Shroud _____ ppm/% Probe _____ ppm/%

Vacuum Shut-in Test

Start Time:_____ Vacuum: _____ "Hg Stop Time:_____ Vacuum: _____ "Hg

Sample Collection

Sample Container (circle one): 1L 6L Other: _____

Flow Controller (circle one): 100 ml/min 200 ml/min Other: _____

Start Time:_____ Vacuum: _____ "Hg Stop Time:_____ Vacuum: _____ "Hg

Split Sample? Yes No Describe Split Method: _____

Comments: _____

Form Completed By: _____ Date: _____

APPENDIX B

Post-Run Tubing Method: Equipment/Materials List, Procedures, and Field Data Form

Post-Run Tubing (PRT) – Suggested Equipment

The below is a list of suggested equipment for soil gas sampling using post-run tubing methods. If using a drilling subcontractor to collect PRT soil gas samples, ensure that the driller is experienced with the equipment and methods. All sampling train components (e.g., tubing, valves, fittings, etc.) should be dedicated or properly decontaminated between sampling locations. Hydrate bentonite or bentonite grout should be applied as seal around the probe rods at ground surface.

PRT Installation

- Level D or Applicable PPE
- Standard Decontamination Equipment
- Geoprobe Equipment Options
    - 1.25-inch Diameter Probe Rod
        - 60-inch length (5-foot) — Cat. # AT1260
        - 48-inch length (4-foot) — Cat. # AT1248
        - 36-inch length (3-foot) — Cat. # AT1236
        - 24-inch length (2-foot) — Cat. # AT1224
        - 12-inch length (1-foot) — Cat. # AT1212
        - 6-inch length (1/2-foot) — Cat. # AT1206
    - Geoprobe Post-Run Tubing System (PRT) Adaptor
        - PRT adaptor for ¼-inch ID tubing — Cat. # PR-25S
        - O-Rings for PRT adaptor — Cat. # PR25R
    - Geoprobe 1.25-inch PRT Expendable Point Holder — Cat. # PR1215
    - Geoprobe 1.0-inch Expendable Point
        - Steel point with O-ring — Cat. # AT14K
        - Steel point without O-ring — Cat. # AT14
    - Geoprobe Manual Slide Hammers
        - 30 Pound hammer — Cat. # 16151
        - 45 Pound hammer — Cat. # 16153
    - Geoprobe Manual Slide Hammer Anvil for 1.25-inch Rods — Cat. # 16175
    - Geoprobe Manual Probe Rod Jack ASM 1.25-inch Rods — Cat. # AT9925
    - Geoprobe Extension Rods to Knock Out Expendable Point
        - 60-Inch Stainless Steel Extension Rods — Cat. # 10073
        - Extension Rod Quick Link Box — Cat. # AT69
- Tubing (1/4" OD): Teflon®, Teflon®-Lined, Nylaflow, or PEEK
- Hydrated Bentonite or Bentonite Grout (5% Bentonite / 95% Portland Cement)

Sampling Train and Sampling Equipment

- Sample Tubing (1/4" OD): Teflon®, Teflon®-Lined, Nylaflow, or PEEK
- Connection/Utility Tubing (3/8" OD): Silicone
- Fittings/Valves: Stainless-Steel and/or Plastic; Ball Valves, 3-Way Valves, Tee Connectors, and/or Couplers (will vary based on user preference and compatibility with laboratory-supplied flow regulators and sampling trains)
- Summa Canister Equipped with Low-Flow Regulator (i.e., <200ml/min)
- Purge Pump: Peristaltic Pump, Lung Box, or Indoor Air Sampling Pump
- Graduated Syringe (alternative to pump for purging)
- Vacuum Gauge (if conducting vacuum shut-in test on sampling train)
- Tedlar® Bags (to monitor soil gas with PID, etc. – not for sample collection)
- Photoionization Detector (PID) Equipped with Appropriate Lamp
- Landfill Gas or Multi-Gas Meter (CH_4, CO_2, O_2, Balance Gas)

Post-Run Tubing (PRT) Procedures

1. Install O-rings on the PRT expendable point holder and the PRT adapter.
2. Drive the PRT rod configuration into the ground, connecting probe rods as necessary to reach the desired depth. After desired depth has been achieved, disengage the expendable drive point.
3. Retract the rods approximately 4 to 6 inches up to create a void from which to sample the soil gas.
4. Insert the PRT adapter end of the tubing down the inside diameter of the probe rods. Feed the tubing down the rod until it hits bottom on the expendable point holder. Allow approximately 4 to 6 ft. of tubing to extend out of the top of the probe rods before cutting it.
5. Grasp the excess tubing end and apply some downward pressure while turning it in a counter-clockwise motion to engage the adapter threads with the expendable point holder. Continue turning until the PRT adapter O-ring bottoms out in the expendable point holder.
6. Pull up lightly on the tubing to test the engagement of the threads. Failure of the PRT adapter to thread could mean that intrusion of soil may have occurred during driving of the rods or disengagement of the expendable drive point.
7. Apply a hydrated bentonite or grout seal at the surface around the probe rod where it enters the ground.
8. Allow the probe to equilibrate for a minimum of 2 hours.
9. Attach the sample tubing to the associated valves and sample container (i.e., Summa canister) to construct the sampling train. The exact sampling train setup may vary depending on user preferences but typically involves the use of a three-way valve or a tee-connector and valves to allow the user to switch flow between tubing leading to the purge pump and tubing leading to the Summa canister while not allowing ambient air to backflow into the system. Refer to Step 1 in Section 3.3 of guidance document and Figure 5 of guidance document.
10. Open the valve to the vacuum pump and purge a minimum three system volumes (i.e., void or pull-back space beneath the terminal geoprobe rod, and the volume of all tubing and fittings within the sample train). Conduct leak detection during purging as applicable (Refer to Section 5 of guidance document).
11. After purging, turn the three-way valve or associated valves to close off the purge tubing from the sampling train while allowing the sample tubing to remain connected to the Summa canister and filled with representative soil gas.
12. Collect soil gas samples as outlined in Section 3.3 of the guidance document.
13. After sample collection, remove the direct-push drive rods and plug the borehole in accordance with applicable regulations.

Terracon Consulting Engineers & Scientists

FIELD DATA FORM: POST-RUN TUBING (PRT) METHOD

PROJECT NAME: _____ Sample ID : _____

PROJECT NO.: _____ Sample Date : _____

Temperature: _____ ^{0}F / ^{0}C Barometric Pressure: _____ "Hg*

Has there been significant rain or snow recent to the sampling event? Yes No

If Yes to above question; Date(s) _____ Amount * _____ in. *(www.localconditions.com)

Location Description: _____ Surface Cover: _____

Subsurface Utilities and distance from probe: _____

Potential VOC sources in the vicinity? _____ Distance from probe: _____ ft.

PRT Probe Details

PRT Equipment/Subcontractor: _____

Sample Zone Soil Type: (circle one): Clay Silt Sand Gravel Other _____

Apparent Moisture Content of Sampling Zone (circle one): dry moist wet (do not sample if saturated)

Borehole Diameter (in.) _____

PRT Probe Terminal Rod Depth (ft.) _____

Rod Pull-Back (in.) _____

Water Source for surface bentonite hydration: _____ Deionized? yes no

Surface Seal Around Probe Rod: _____

Sample Purging

Equlibration time between probe installation and purging: _____ hours (2 hours recommended)

Pull-Back Space Volume: _____ ml

Tubing Type: _____ Tubing Length: _____ ft. Tubing Diameter: _____ inch

Purging Method: _____ Pump Rate: _____ ml / min. Purging Duration: _____ min.

Volume Purged: _____ ml (Refer to Table 2 on page 13 of guidance for assistance with calculating volume purged)

PID / FID at Initial Purge: _____ ppm PID / FID at Sample Collection: _____ ppm

Leak Test Prior to Sample Collection? Yes No Method _____

Helium Tracer Test Tracer Compound: _____ Instrument: _____

Tracer Concentration, Test 1 Shroud _____ ppm/% Probe _____ ppm/%

Tracer Concentration, Test 2 Shroud _____ ppm/% Probe _____ ppm/%

Tracer Concentration, Test 3 Shroud _____ ppm/% Probe _____ ppm/%

Vacuum Shut-in Test

Start Time:_____ Vacuum: _____ "Hg Stop Time:_____ Vacuum: _____ "Hg

Sample Collection

Sample Container (circle one): 1L 6L Other: _____

Flow Controller (circle one): 100 ml/min 200 ml/min Other: _____

Start Time:_____ Vacuum: _____ "Hg Stop Time:_____ Vacuum: _____ "Hg

Split Sample? Yes No Describe Split Method: _____

Comments: _____

Form Completed By: _____ Date: _____

APPENDIX C

Subslab Soil Gas: Equipment/Materials List, Procedures, and Field Data Form

Sub-Slab Soil Gas – Suggested Equipment

The below is a list of suggested equipment for sub-slab port installation. Various alternatives exist for fittings and couplers that can be used to construct the ports. Stainless-steel tubing and fittings are recommended since brass components may lead to cross-contamination from cutting fluids. If using brass components, make sure they are properly decontaminated. All sampling train components (e.g., tubing, valves, fittings, etc.) should be dedicated or properly decontaminated between sampling locations.

Sub-Slab Port Construction

- Level D PPE
- Rotary Hammer Drill
- 1" or 1 ½" Diameter Carbide Masonry Drill Bit
- 3/4" or 3/8" Diameter Carbide Masonry Drill Bit
- Wet/Dry Vacuum Equipped with HEPA Filtration Unit
- Spray Bottle with Deionized or Distilled Water
- Dead-Blow Hammer
- 1/4" Outer-Diameter Stainless Steel Tubing
- 1/4" Swagelok® Nut
- Swagelok® SS-400-7-4 Female Adapter
- Swagelok® SS-400-1-4 Male Connector
- Teflon Washer or Modeling Clay
- Portland Cement

Sampling Train and Sampling Equipment

- Sample Tubing (1/4" OD): Teflon®, Teflon®-Lined, Nylaflow, or PEEK
- Connection/Utility Tubing (3/8" OD): Silicone
- Fittings/Valves: Stainless-Steel and/or Plastic; Ball Valves, 3-Way Valves, Tee Connectors, and/or Couplers (will vary based on user preference and compatibility with laboratory-supplied flow regulators and sampling trains)
- Summa Canister Equipped with Low-Flow Regulator (i.e., <200ml/min)
- Purge Pump: Peristaltic Pump, Lung Box, or Indoor Air Sampling Pump
- Graduated Syringe (alternative to pump for purging)
- Vacuum Gauge (if conducting vacuum shut-in test on sampling train)
- Tedlar® Bags (to monitor soil gas with PID, etc. – not for sample collection)
- Photoionization Detector (PID) Equipped with Appropriate Lamp
- Landfill Gas or Multi-Gas Meter (CH_4, CO_2, O_2, Balance Gas)

Subslab Soil Gas Procedures

1. Clear the locations all on-site utilities that may be located beneath or within the slab. Additionally, clear the locations of all post-tension cables and other foundation features such as radiant-heat flooring.
2. Drill a ⅜"-diameter pilot hole approximately 2 inches in depth.
3. Using the ⅜" pilot hole as your center, drill a 1"-diameter outer hole to a depth of approximately 1 ⅜". Vacuum any cuttings out of the hole.
4. Continue drilling the ⅜" inner or pilot hole through the slab and a few inches into the subslab material. While drilling, carefully vacuum out any cuttings from the outer hole.
5. Determine the length of stainless-steel tubing required to reach from the bottom of the outer hole, through the slab and into the open cavity below the slab. To avoid obstruction of the probe tube, ensure that it does not contact the subslab material. Using a tube cutter, cut the tubing to the desired length.
6. Attach a measured length (typically 3"-4") of ¼" OD stainless tubing to the female connector with a Swagelok® nut. Make sure that the tubing rests firmly in the fitting body and that the nut is finger-tight. While holding the fitting body firmly, tighten the nut 1¼ turns.
7. Insert the ¼" hex socket plug into the female connector. If using a stainless steel socket plug, wrap one layer of Teflon® thread tape around the threads to prevent binding. If using a brass socket plug, no Teflon® tape is needed. Tighten the plug slightly. Do not over tighten. If excessive force is required to remove the plug during the sample set up phase, the probe may break loose from the anchoring cement.
8. Place the completed probe into the outer hole to check fit and to ensure that stainless steel tubing is not in contact with the subslab material. Make necessary adjustments to the hole or probe assembly.
9. In a disposable cup or other container, mix a small amount of the anchoring cement or grout. Add water sparingly to create a mixture that is fairly stiff and moldable. Place a spoonful or two of the cement/grout around the stainless steel tubing adjacent to the female connector nut. Mold the cement/grout into a mass around the connector nut and up around the main body of the probe assembly. Slide the Teflon washer onto the stainless steel tube so that it rests next to the cement/grout mixture. The washer will prevent any anchoring cement/grout from flowing into the inner hole during the final step of probe installation.
10. Carefully place the probe assembly into the drilled hole, applying light pressure to seat the assembly. While inserting the probe assembly, work the concrete/grout mixture to fill voids. Clean up cement/grout that discharged out of the hole during placement; avoid getting any of the concrete/grout into fittings or on fitting threads. Allow the cement/grout to cure according to manufacturer's instructions before sampling.

11. Allow the subslab soil gas probe to equilibrate for a minimum of 24 hours prior to purging or sampling. If project schedule does not allow for this equilibration period, contact a member of the Vapor Encroachment/Intrusion Committee for purging alternatives to reduce the equilibration period.
12. Attach sample tubing to the subslab probe and the associated valves and sample container (i.e., Summa canister) to construct the sampling train. The exact sampling train setup may vary depending on user preferences but typically involves the use of a three-way valve or a tee-connector and valves to allow the user to switch flow between tubing leading to the purge pump and tubing leading to the Summa canister while not allowing ambient air to backflow into the system. Refer to Step 1 in Section 3.3 of guidance document and Figure 5 of guidance document.
13. Open the valve to the vacuum pump and purge a minimum three system volumes (i.e., the volume of all tubing and fittings within the sampling train). Conduct leak detection during purging as applicable (Refer to Section 5 of guidance document).
14. After purging, turn the three-way valve or associated valves to close off the purge tubing from the sampling train while allowing the sample tubing to remain connected to the Summa canister and filled with representative soil gas.
15. Collect soil gas samples as outlined in Section 3.3 of the guidance document.
16. After sample collection, remove the subslab probes and patch to match existing grade.

Standard Operating Procedure Installation and Extraction of the Vapor Pin™

May 20, 2011

Scope:

This standard operating procedure describes the installation and extraction of the Vapor Pin™[1] for use in sub-slab soil-gas sampling.

Purpose:

The purpose of this procedure is to assure good quality control in field operations and uniformity between field personnel in the use of the Vapor Pin™ for the collection of sub-slab soil-gas samples.

Equipment Needed:

- Assembled Vapor Pin™ [Vapor Pin™ and silicone sleeve (Figure 1)];
- Hammer drill;
- 5/8-inch diameter hammer bit (Hilti™ TE-YX 5/8" x 22" #00206514 or equivalent);
- 1½-inch diameter hammer bit (Hilti™ TE-YX 1½" x 23" #00293032 or equivalent) for flush mount applications;
- ¾-inch diameter bottle brush;
- Wet/dry vacuum with HEPA filter (optional);
- Vapor Pin™ installation/extraction tool;
- Dead blow hammer;
- Vapor Pin™ flush mount cover, as necessary;
- Vapor Pin™ protective cap; and
- VOC-free hole patching material (hydraulic cement) and putty knife or trowel.

[1]Cox-Colvin & Associates, Inc., designed and developed the Vapor Pin™; a patent is pending.

Figure 1. Assembled Vapor Pin™.

Installation Procedure:

1) Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.

2) Set up wet/dry vacuum to collect drill cuttings.

3) If a flush mount installation is required, drill a 1½-inch diameter hole at least 1¾-inches into the slab.

4) Drill a 5/8-inch diameter hole through the slab and approximately 1-inch into the underlying soil to form a void.

5) Remove the drill bit, brush the hole with the bottle brush, and remove the loose cuttings with the vacuum.

6) Place the lower end of Vapor Pin™ assembly into the drilled hole. Place the small hole located in the handle of the extraction/installation tool over the Vapor Pin™ to protect the barb fitting and cap, and tap the Vapor Pin™ into place using a

dead blow hammer (Figure 2). Make sure the extraction/installation tool is aligned parallel to the Vapor Pin™ to avoid damaging the barb fitting.

Figure 2. Installing the Vapor Pin™.

For flush mount installations, unscrew the threaded coupling from the installation/extraction handle and use the hole in the end of the tool to assist with the installation (Figure 3).

Figure 3. Flush-mount installation.

During installation, the silicone sleeve will form a slight bulge between the slab and the Vapor Pin™ shoulder. Place the protective cap on Vapor Pin™ to prevent vapor loss prior to sampling (Figure 4).

Figure 4. Installed Vapor Pin™.

7) For flush mount installations, cover the Vapor Pin™ with a flush mount cover.

8) Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil-gas conditions to equilibrate prior to sampling.

9) Remove protective cap and connect sample tubing to the barb fitting of the Vapor Pin™ (Figure 5).

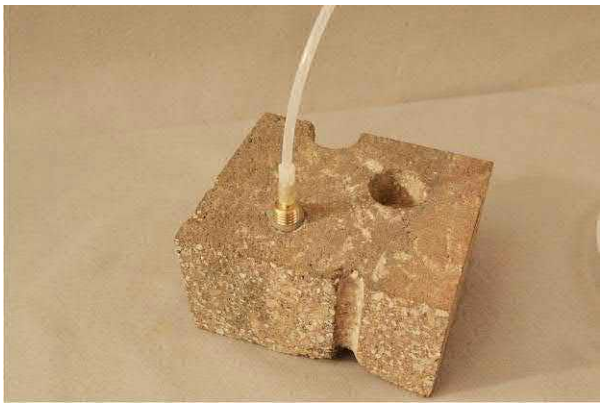

Figure 5. Vapor Pin™ sample connection.

10) Conduct leak tests [(e.g., real-time monitoring of oxygen levels on extracted sub-slab soil gas, or placement of a water

dam around the Vapor Pin™) Figure 6]. Consult your local guidance for possible tests.

Figure 6. Water dam used for leak detection.

11) Collect sub-slab soil gas sample. When finished sampling, replace the protective cap and flush mount cover until the next sampling event. If the sampling is complete, extract the Vapor Pin™.

Extraction Procedure:

1) Remove the protective cap, and thread the installation/extraction tool onto the barrel of the Vapor Pin™ (Figure 7). Continue turning the tool to assist in extraction, then pull the Vapor Pin™ from the hole (Figure 8).

Figure 7. Removing the Vapor Pin™.

Figure 8. Extracted Vapor Pin™.

2) Fill the void with hydraulic cement and smooth with the trowel or putty knife.

3) Prior to reuse, remove the silicone sleeve and discard. Decontaminate the Vapor Pin™ in a hot water and Alconox® wash, then heat in an oven to a temperature of 130° C.

The Vapor Pin™ to designed be used repeatedly; however, replacement parts and supplies will be required periodically. These parts are available on-line at www.CoxColvin.com.

Replacement Parts:

Vapor Pin™ Kit Case - VPC001
Vapor Pins™ - VPIN0522
Silicone Sleeves - VPTS077
Installation/Extraction Tool - VPIE023
Protective Caps - VPPC010
Flush Mount Covers - VPFM050
Water Dam - VPWD004
Brush - VPB026

Terracon Consulting Engineers & Scientists

FIELD DATA FORM: SUB-SLAB SOIL GAS SAMPLING

PROJECT NAME: _____ Sample ID : _____

PROJECT NO.: _____ Sample Date : _____

Outside Temperature: _____ ^{0}F / ^{0}C Indoor Temperature: _____ ^{0}F / ^{0}C

Building Type/Use: _____ Occupant: _____

Description of Room/Sample Area: _____

HVAC Unit Operating? Term Prior to Sampling? _____ (48 hours recommended)

Floor Materials / Covering: _____

Subslab Utilities and Distance from Probe: _____

Potential VOC sources in the vicinity: _____ Distance from probe: _____ ft.

Drill/Corehole Details

Slab Coring/Drilling Equipment Used: _____

Outer Hole Thickness: _____ in. (Typical 1 inch, max recommended 1.5 inches)

Slab Thickness: _____ in. (Drilled as 3/8-inch pilot hole through slab)

Base Material Beneath Slab (circle one): sand gravel clay crushed rock other: _____

Apparent Moisture Content (circle one): dry moist wet (do not sample if saturated)

Gas Probe Details

Sample Tubing Length (in.): _____ Sample Tubing Diameter (in.): _____

Tubing Depth from Top of Slab (in.): _____ (Tubing should 'float' approx. 1/4-inch above hole bottom)

Anchoring Cement Type / Name: _____

Surface Completion / Protection: _____

IF VaporPin™ Used, Circle Type: brass stainless-steel

Sample Purging

Equlibration time between probe installation and purging: _____ hours / days (24 hours recommended)

Tubing Type: _____ Tubing Length: _____ ft. Tubing Diameter: _____ inch

Purging Method: _____ Pump Rate: _____ ml / min. Purging Duration: _____ min.

Volume Purged: _____ ml (Refer to Table 2 on page 13 of guidance for assistance with calculating volume purged)

PID / FID at Initial Purge: _____ ppm PID / FID at Sample Collection: _____ ppm

Leak Test Prior to Sample Collection? Yes No Method _____

Helium Tracer Test Tracer Compound: _____ Instrument: _____

Tracer Concentration, Test 1 Shroud _____ ppm/% Probe _____ ppm/%

Tracer Concentration, Test 2 Shroud _____ ppm/% Probe _____ ppm/%

Tracer Concentration, Test 3 Shroud _____ ppm/% Probe _____ ppm/%

Vacuum Shut-in Test

Start Time:_____ Vacuum: _____ "Hg Stop Time:_____ Vacuum: _____ "Hg

Sample Collection

Sample Container (circle one): 1L 6L Other: _____

Flow Controller (circle one): 100 ml/min 200 ml/min Other: _____

Start Time:_____ Vacuum: _____ "Hg Stop Time:_____ Vacuum: _____ "Hg

Split Sample? Yes No Describe Split Method: _____

Comments: _____

Form Completed By: _____ Date: _____

APPENDIX D

Available Soil Gas Analytical Methods

AVAILABLE SOIL GAS ANALYTICAL METHODS AND TYPICAL COSTS[1]		
Parameter	Method	Typical Cost[2]
BTEX, MTBE, TPH	EPA TO-3	$75
VOCs (1 - 20 compounds), 5 - 20 ppb	EPA TO-15	$90
VOCs (1 - 20 compounds), 0.5 - 2 ppb	EPA TO-15	$110
Polar and nonpolar VOCs	EPA TO-15	$125
Low-level VOCs	EPA TO-15 SIM	$165
PCBs/Pesticides	EPA TO-4A or TO-10A	$175
SVOCs	EPA TO-13A	$190
Dioxins/Furans	EPA TO-9A	$675
Fixed gases (methane, nitrogen, oxygen)	ASTM D1946	$115
Fixed gases (CO2 only)	ASTM D1946	$100

NOTES:

[1]Common available analytical methods are listed in the table above. The list is not all-inclusive. Modified EPA SW-846 Methods 8021 and 8260 can be utilized to analyze soil gas. If using modified SW-846 Methods, ensure that the detection limits will be low enough to compare your data to the applicable regulatory criteria. Also ensure that your state or jurisdiction accepts the use of modified SW-846 Methods.

[2]Typical costs based on 2013 industry averages.

APPENDIX E

References

Abreu, L., and P.C. Johnson. 2005. *Effect of Vapor Source – Building Separation and Building Construction on Soil Vapor Intrusion as Studied with a Three-Dimensional Numerical Model*, Environmental Science and Technology, v. 39, no. 12, p. 4550-4561.

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ESC LAB SCIENCES
a subsidiary of Pace Analytical

HEXAVALENT CHROMIUM (CR6)

Aqueous Sampling Instructions - Methods 218/7199/3500

This sampling device extends the holding time from 24 hours to 28 days.
Samples are field filtered and preserved.

Directions:

1. Fill 50ml plastic vial with sample.
2. Put filter on top of vial and attach plunger to top.
3. Slowly push plunger into sample vial to filter the water.
4. Push until filter stops or to the 20ml line on vial.
5. Add preservative to sample and cap.
6. Return in cooler preserved on ice.

Single use only - Do Not Re-use.

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sales@esclabsciences.com

2018b Terracon Consultants, Inc., 2018. *Community-Wide Quality Assurance Project Plan, Revision 2, Salt Lake County Brownfields Assessment, EPA Cooperative Agreement No. 96835701, Salt Lake County, Utah*. Terracon Project No. 6177082. Dated May 24, 2018.

COMMUNITY-WIDE QUALITY ASSURANCE PROJECT PLAN (Revision 2)

Salt Lake County Brownfields Assessments

EPA Cooperative Agreement No. 96835701

Salt Lake County, Utah

May 24, 2018

Terracon Project No. 61177082

Prepared for:
Salt Lake County

Prepared by:
Terracon Consultants, Inc.
Salt Lake City, Utah

GROUP A PROJECT MANAGEMENT

A1 Title and Approval Sheet

Project Title:
Community-Wide Quality Assurance Project Plan (Revision 2)
Salt Lake County Brownfields Assessment
EPA Cooperative Agreement No. 96835701
Salt Lake County, Utah

Terracon Consultant Project Manager

Signature _____ Date 5/25/2018

Andy King, P.G.
Printed Name

Terracon Consultant QA/QC Officer

Signature _____ Date 5/25/18

Craig D. Eaton, P.G.
Printed Name

Salt Lake County (Grantee) Approval:

Signature _____ Date 5/25/2018

Ruedigar Matthes
Printed Name

U.S. EPA Project Manager/QA Officer Approval:

Signature _____ Date 5/24/18

Christina Wilson
Printed Name

N:\Projects\2017\61177082\Working Files\DRAFTS (Proposal-Reports-Communications)\for QAPP\61177082_QAPP SL County Brownfields_Rev2.docx

A2 Table of Contents

FIGURES

TABLES

APPENDICES

A2.1 Acronym List

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, as Amended
DERR	Division of Environmental Response and Remediation
DL	laboratory reporting limit a.k.a. practicable quantification limit
DQI	Data Quality Indicators
DQO	Data Quality Objectives
EDD	Electronic Data Deliverable
ESA	Environmental Site Assessment
ESC	ESC Laboratories
HASP	Health and Safety Plan
LCS	Laboratory Control Sample
LFB	Laboratory Fortified Blank
LIMS	Laboratory Information Management System
LRL	Laboratory Reporting Limit
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram (or parts per million)
mg/L	milligrams per liter (or parts per million)
µg/kg	micrograms per kilogram (or parts per billion)
µg/L	micrograms per liter (or parts per billion)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NELAP	National Environmental Laboratory Accreditation Program
OSHA	Occupational Safety and Health Act
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
ppb	parts per billion (in µg/kg or µg/L)
ppm	parts per million (in mg/kg or mg/L)
PR	Percent Recovery
PS	Performance Standard
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RDA	Redevelopment Agency of Salt Lake City
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
TOC	Table of Contents
UDEQ	Utah Department of Environmental Quality
US EPA	United States Environmental Protection Agency

A3 Distribution List

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Environmental Laboratory: ESC Lab Sciences
Steve Miller, Laboratory Quality Assurance Director
12065 Lebanon Road
Mt. Juliet, Tennessee 37207
Phone: (615) 773-9684
Email: smiller@esclabsciences.com

A4 Project/Task Organization

This Community-wide Quality Assurance Project Plan (QAPP) provides guidelines for the acquisition, analysis, and validation of data collected as part of the Salt Lake County Brownfields Assessments. Following is a brief description and identification of key personnel involved in conducting Phase II Environmental Site Assessments (ESAs) as part of the Salt Lake County Brownfields Assessment Grant project. An organizational chart indicating the roles of these individuals is included as **Figure 1**.

Salt Lake County Project Manager

The Salt Lake County Project Manager is the central point of contact for directing Salt Lake County Brownfields Assessment Grant activities and problem resolution, and is the primary point of contact with the Consultant Project Manager regarding administrative and technical issues associated with this project. The Salt Lake County Project Manager for this project is:

Ruedigar Matthes
Economic Development Research Coordinator
Salt Lake County Department of Transportation, Housing, and Economic Development
2001 South State Street S2 100
Salt Lake City, UT 84114
(385) 468-4868
Email: RMatthes@slco.org

Consultant Project Manager

The Consultant Project Manager will have responsibility for overseeing the activities associated with the Phase II ESAs. This person will be responsible for the preparation and maintenance of the QAPP, for distribution of the most current version of the QAPP to the individuals identified in A3, preparing and/or overseeing preparation of Sampling and Analysis Plans (SAPs) for individual sites, and for overall management of the field investigation portion of the project. The Consultant Project Manager will coordinate closely with the Consultant Quality Assurance/Quality Control (QA/QC) Officer and provide oversight during the field activities with routine visits to the jobsite(s). The Consultant Project Manager will be the primary technical point of contact for communication with Salt Lake County. Additional responsibilities include scheduling, subcontractor procurement, cost accounting and reporting, identification of potential

problems and development of contingency plans to respond to the identified problems. The Consultant Project Manager for this project is:

Mr. Andy King, P.G.
Terracon Consultants, Inc.
6949 South High Tech Drive
Midvale, UT 84047
Phone: (801) 746-5443
Email: andy.king@terracon.com

Consultant QA/QC Officer

The Consultant QA/QC Officer for this project will act as an independent advisor to the Consultant Project Manager and will oversee project activities as necessary. This role will include providing surveillance level oversight, laboratory performance evaluation, and data quality validation with QA/QC reviews of all data included in final Phase II ESA reports for properties that are assessed as part of this project. The Consultant QA/QC Officer will not take part in data collection activities. The Consultant QA/QC Officer for this project is:

Mr. Craig D. Eaton, P.G.
Terracon Consultants, Inc.
6949 South High Tech Drive
Midvale, UT 84047
Phone: (801) 746-5446
Email: craig.eaton@terracon.com

EPA Project Officer

The EPA Project Officer will review and approve the QAPP,SAPs, and revisions in terms of quality-assurance aspects; review and approve site eligibility determinations; provide technical assistance to the Grantee; review progress reports; and review draft and final reports when requested. The EPA Project Officer is:

Ms. Christina Wilson
1595 Wynkoop Street
Denver, Colorado 80202
Phone: (303) 312-6706
Email: Wilson.Christina@epa.gov

UDEQ Project Manager

If impacted environmental media (e.g., soil, groundwater, surface water) are identified during assessment activities, the UDEQ will be the agency providing oversight for any subsequent cleanup activities that may be undertaken (which are beyond the scope of assessment activities). The UDEQ will remain a technical resource for the field activities and reporting throughout the course of the project. The UDEQ Project Manager for this project is:

Mr. Joseph Katz
Utah Department of Environmental Quality
Division of Environmental Response and Remediation
P.O. Box 144840
Salt Lake City, UT 84114-4840
(801) 536-4104
Email: jkatz@utah.gov

Environmental Laboratory: ESC Lab SciencesSamples of environmental media that are collected during the course of Phase II ESAs will be analyzed by ESC Lab Sciences. ESC Lab Sciences is an environmental analytical firm providing technical and support services to customers nationwide, with a diverse accreditation/certification program which represents over 48 separate state and national accreditations. ESC Lab Sciences is responsible for providing reliable and high-quality analytical data, using the quality systems detailed in its Quality Assurance Manual (Appendix A of this QAPP). The Quality Assurance Director for ESC Lab Sciences is responsible for managing the implementation, monitoring, and development of the laboratory's Quality Assurance Systems as well as overseeing laboratory safety, waste management, internal and external audits, and new method implementation. The Environmental Laboratory and Quality Assurance Director are:

ESC Lab Sciences
Steve Miller, Laboratory Quality Assurance Director
12065 Lebanon Road
Mt. Juliet, Tennessee 37207
Phone: (615) 773-9684
Email: smiller@esclabsciences.com

A5 Problem Definition/Background

A5.1 Purpose /Background

A Brownfield is a real property, the expansion, redevelopment, or reuse of which may be complicated by the real or potential presence of a hazardous substance, pollutant, or contaminant. Salt Lake County (the Grantee) is a recipient of an EPA community-wide assessment grant to inventory, characterize, assess, and conduct cleanup planning along with public outreach activities for eligible Brownfield sites located within County boundaries, including, but not limited to: metro townships, incorporated cities, and unincorporated areas/islands. This grant program will help evaluate select County properties that have an established history of petroleum or hazardous substance impacts, where significant uncertainty exists due to real or perceived contamination, and will benefit from EPA grant funds to support a range of environmental assessment work and cleanup planning targets.

As qualified and eligible high-priority properties are identified within the County, Phase I ESAs will be conducted on selected properties. The Phase I ESAs will be conducted consistent with the procedures included in ASTM E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* and EPA's All Appropriate Inquiries Rule (Code of Federal Regulations, Title 40, Part 312: Innocent Landowners, Standards for Conducting All Appropriate Inquiries).

In cases where the Phase I ESAs identify Recognized Environmental Conditions (RECs), Phase II ESAs will subsequently be conducted to investigate the identified RECs. The Phase II ESAs will be conducted consistent with ASTM E1903-11 *Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process*. The Phase II ESAs will generally include sampling and analysis of environmental media (for example, soil, groundwater, surface water, or soil vapor) to develop environmental condition profiles. The resulting analytical data from Phase II ESAs will be compared against applicable screening levels (as outlined in Section A7.2) to allow evaluation of whether site redevelopment can occur without environmental remedy, or to support planning for an appropriate remedial response. This community-wide QAPP details quality assurance procedures that are applicable to all Phase II ESAs that will be conducted under the assessment grant. In addition to this QAPP, a separate site-specific Sampling and Analysis Plan (SAP) will be developed for each site that is identified for subsequent Phase II assessment. The site-specific problem definition and decisions to be resolved will be detailed in each SAP, and will depend upon conditions at each site including

- Site physical characteristics
- Proposed future use and/or redevelopment plan
- Historical and current uses
- Findings of previous investigations
- Known or anticipated contaminants

Each SAP will identify the specific investigation approach, sampling locations and rationale, and laboratory analyses that are applicable to each individual site, and will be developed and approved by the Agencies prior to conducting the Phase II ESA.

A6 Project Task/Description and Schedule

The results of Phase I ESAs, at sites where RECs are identified, will be used as a basis for planning subsequent Phase II ESAs. A SAP will be developed for the Phase II assessment to be conducted on each selected property; each SAP will detail the contaminants of concern, sampling locations, and sampling rationale for that particular site. Potential contaminants of concern may include, but are not limited to, petroleum hydrocarbons, oil and grease, solvents, and heavy metals. A Phase II ESA will be conducted at each site only after the corresponding site-specific SAP has been developed and approved by the Agencies.

Work schedules, detailed geographical locations to be studied, and resource and time constraints for each Phase II ESA will be included in the individual SAP.

A7 Quality Objectives and Criteria for Measurement Data

A7.1 Data Quality Objectives

Data Quality Objectives (DQOs) are quantitative and qualitative statements that specify the quality of data required to support the objectives of an investigation. DQOs are generated through the DQO Process, as shown in Guidance on Systematic Planning Using the Data Quality Objectives Process (QA/G-4) (EPA; February, 2006).

A7.2 Measurement Performance Criteria

Table 1 provides measurement performance criteria, which are Data Quality Indicators (DQIs) expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). The DQIs provide verifiable measurement criteria to assess data quality. Following is a brief definition of the PARCCS parameters, including bias.

Precision	The measure of agreement among repeated measurements of the same property under identical, or substantially similar conditions; calculated as either the range or as the standard deviation. Precision may also be expressed as a percentage of the mean of the measurements, such as relative range or relative standard deviation (coefficient of variation).
Bias	The systematic or persistent distortion of a measurement process that causes errors in one direction. Use reference materials or analyze spiked matrix samples.
Accuracy	A measure of the overall agreement of a measurement to a known value; includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations.
Representativeness	A qualitative term that expresses "the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition." (ANSI/ASQC 1995)
Comparability	A qualitative term that expresses the measure of confidence that one data set can be compared to another and can be combined for the decision(s) to be made.
Completeness	A measure of the amount of valid data needed to be obtained from a measurement system.

Sensitivity	The capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest.

The Consultant QA/QC Officer will evaluate the PARCCS parameters in terms of the DQIs presented in Table 1. Precision will be evaluated on the basis of relative percent difference (RPD) as a measure of reproducibility between LCS/LCSD pairs and MS/MSD pairs (analytical precision), and between field samples and field duplicate samples (field precision). Bias and Accuracy will be evaluated through a review of the method blanks, LCS/LCSD, and MS/MSD summaries provided by the laboratory. Method blank analyte concentrations are expected to be below laboratory reporting limits, while LCS/LCSD and MS/MSD pairs are expected to be within the laboratory/method standards. Representativeness will be ensured by use of appropriate sampling locations, collection and preservation methods (including sample holding times), and analytical procedures according to the approved SAPs. Comparability will be ensured through the use of standardized sampling procedures in accordance with the approved SAP and QAPP, use of standardized and approved laboratory analytical methods, and reporting the analytical results in appropriate and consistent units. Completeness is the ratio of valid measurements to the number of planned measurements, expressed as a percentage, and the completeness goal for the project is 90%. The level of sensitivity must be such that the laboratory reporting limits are sufficiently low as to allow identification of analyzed constituent concentrations that are above applicable regulatory screening levels.

Soil and groundwater samples submitted for laboratory analyses will be considered definitive, consistent with EPA Superfund Data Categories (EPA; September 1993). Analytical results will be evaluated using current EPA Regional Screening Levels (RSLs), Utah's Groundwater Quality Standards, and the US EPA's Vapor Intrusion Screening Levels and Maximum Contaminant Levels, as applicable. Petroleum hydrocarbon impacts suspected to originate from an underground storage tank will be evaluated using the Utah Department of Environmental Quality, Division of Environmental Response and Remediation, Leaking Underground Storage Tank Program's Cleanup Levels (i.e., Initial Screening Levels and Tier 1 Screening Levels). Results for asbestos samples, if collected, will be compared to standards at U.S. EPA 40 CFR Part 60 Subpart M (Asbestos NESHAP) and Utah Department of Environmental Quality, Division of Air Quality standards (UAC R307-801), and lead-based paint samples, if collected, will be compared to HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing. As such, the level of data sensitivity is required to result in laboratory reporting limits (practical quantitation limits or PQLs) that are below the regulatory screening levels listed above.

Certification and validation requirements apply to the laboratory. Regularly scheduled analyses of known duplicates, standards, and spiked samples are a routine aspect of data reduction, validation, and reporting procedures for the laboratory. The laboratory, which is associated with the National Environmental Laboratory Accreditation Program (NELAP), will verify the reliability and credibility of the analytical results. Additionally, the laboratory reporting limits need to be

lower than the screening levels for each of the analytes analyzed. A copy of the ESC Lab Sciences (ESC) Quality Assurance Manual (QAM) with the laboratory reporting levels is provided in **Appendix A**.

A8 Special Training Requirements

The Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training, including an up-to-date 8-hour refresher course as required by OSHA, is required for field personnel. Initial 40-hour HAZWOPER "live" training is provided by reputable training providers in the local community, and annual refreshers are provided either by "live" training or via online courses approved by Terracon's Corporate Safety and Health Manager. The Consultant Project Manager will ensure that training/certification requirements are satisfied for all field personnel prior to their entry to any project site where Phase II ESA activities are conducted. Documentation (training certificates) of HAZWOPER and refresher training is maintained by Terracon's Corporate Safety and Health Manager in employees' confidential medical surveillance/environmental training files. In addition, Terracon's environmental project managers (or designees) are responsible for conducting site-specific safety briefings prior to beginning all Terracon hazardous waste site projects. Terracon will prepare a site-specific Health and Safety Plan (HASP) prior to mobilizing to the site to identify specific hazards that may be encountered during all phases of the field work. Terracon will also require any onsite subcontractors (e.g., drillers) to provide documentation of current HAZWOPER certification prior to mobilization. In addition, Terracon personnel that collect samples of potential asbestos-containing material will be Certified Asbestos Building Inspectors as required by Utah Division of Air Quality rules at UAC R307-801. Terracon personnel who engage in lead-based paint activities, if needed, will meet applicable Utah Division of Air Quality certification requirements at UAC R307-842. Terracon personnel who conduct hazardous materials surveys will be Pre-Demolition Inspectors certified by the Salt Lake Valley Health Department. Documentation of these certifications is maintained in Terracon databases at both the local and corporate levels.

A9 Documentation and Records

The data collected during the assessments will be summarized in Phase II ESA reports documenting the investigation procedures and results, along with supporting maps, figures, and data summary tables. Appendices will include appended data for analyses, including laboratory QA/QC evaluation, chain of custody documentation, and field forms. Phase I ESA reports, where prepared, will be prepared consistent with ASTM E1527-13 and Phase II reports will be prepared consistent with ASTM E1903-11. Phase II reports will include discussion and general recommendations for identified conditions that must be considered in planning for future redevelopment, as applicable. These may include, for example, impacted environmental media and/or building-related conditions such as asbestos and other hazardous materials that require further investigation, cleanup, or proper management as part of building demolition/renovation. As requested by Salt Lake County, separate cleanup planning documents will be developed for

those sites where cleanup has been deemed necessary; the planning documents will not be a complete Remedial Action Plan, but will help outline a specific cleanup path.

Field personnel will maintain a field log to record pertinent activities associated with sampling activities. Photographic documentation will also be recorded in the field log, as will documentation of any field problems and corrective measures taken. Additional field documents will include sketch maps, field forms, borehole logs, and chain of custody records.

Labels generated by the laboratory will be affixed to sample containers and completed by field personnel. The labels will identify sample numbers, dates and times collected, and requested analyses. Chain of custody records will be maintained for all samples from the time of collection through the time of submittal to the laboratory for analysis.

Electronic project documents (including but not limited to word processing files, spreadsheets, laboratory analytical reports, project photographs, and CAD/GIS files) will be stored for a minimum of five years in an electronic project folder on a local server hard drive in the Terracon office that is backed up automatically on a daily basis to a separate file server hard drive at Terracon's corporate office in Olathe, Kansas. In addition, analytical reports and chain-of-custody records will be maintained indefinitely on the analytical laboratory's LIMS database, and made available via the laboratory's secured online data access system.

Samples will be submitted to the laboratory, using standard turnaround times unless alternate turnaround times are requested on chain of custody records for individual sample sets. It is anticipated that ESC will be used for analyses; ESC is certified with the State of Utah. If another laboratory performs analyses, it must meet the following criteria and submit QA/QC documentation to the EPA for approval as described above:

- Demonstrated ability to achieve the required detection limits;
- Certified by the State of Utah for the specific analyses;
- Ability to meet the project's analytical QC requirements, which includes a laboratory method blank, laboratory control sample, matrix spike and matrix spike duplicate performed on one of the project's samples, chromatograms, and narrative report of QC results and any corrective actions required; and
- Follows an internal QA/QC Program.

Details of the laboratory QA/QC Program are presented in **Appendix A**.

GROUP B MEASUREMENT/DATA ACQUISITION

B1 Sampling Process Design

Site-specific SAPs will be developed to include each site selected for Phase II ESA investigation. Regulatory and historical data collected during the Phase I ESA, a visual inspection of the property, and any identified RECs will be used to develop the SAPs. Each SAP will be reviewed and approved by the Agencies prior to implementation.

B2 Sampling Methods Requirements

Samples will be collected following applicable Terracon Standard Operating Procedures (SOPs) included in **Appendix B**. The SOPs include lists of equipment needed for each SOP, and were developed in general accordance with *Guidance for Preparing Standard Operating Procedures (SOPs) (QA/G-6)* (U.S. EPA, April 2007). If problems develop in the field during implementation of an SOP, field personnel will contact the Consultant Project Manager and Consultant QA/QC Officer for information on appropriate corrective action, and the problem and corrective action will be documented in the field log book.

B3 Sample Handling, Preservation and Custody Requirements

Samples will be identified, labeled, preserved, and handled following SOP 20, which includes chain of custody and documentation procedures. An example sample label and chain of custody form are included as attachments to SOP 20.

Required sample containers, sample volumes, sample holding times, and sample preservation methods for a variety of analytical parameters including those that are likely to be used in the assessments are summarized in Table 14.6 of Appendix III to the ESC QAM, see **Appendix A** of this QAPP. The primary analytical parameters anticipated for the assessments include, but are not limited to, the following: volatile organic compounds (EPA Method 8260); semi-volatile organic compounds (EPA Method 8270); total petroleum hydrocarbons – gasoline range organics (EPA Method 8260); total petroleum hydrocarbons-diesel range organics (EPA Method 8015); oil & grease (EPA Methods 1664/9071); and metals (EPA Methods 6010//6020/7470/7471).

Samples will be placed into the appropriate laboratory-provided container immediately after collection. The container will remain in the sight of the sampler or will be locked in a secured area until the samples are transported under chain of custody protocols for delivery to the laboratory.

B4 Analytical Methods Requirements

All analytical methods will follow standard EPA procedures as outlined in Test Methods for Evaluating Solid Wastes - Physical/Chemical Methods (SW-846) as updated. Please refer to

SW-846 and the ESC QAM (**Appendix A** of this QAPP) for analytical SOPs and information regarding analytical equipment, instrumentation, performance criteria, corrective action procedures and documentation, sample disposal, and method validation information and procedures for nonstandard methods. Laboratory turnaround times needed will be specified on chain of custody records for each sample set, but will typically be the standard ESC turnaround time of 7 working days.

B5 Quality Control Requirements

B5.1 Definitive Data

To ensure that high quality, reliable data are consistently collected, and that data are comparable to previous investigations, QA procedures will be followed throughout the investigation. Quality assurance procedures include using the data quality objectives, following SOPs, and collecting and analyzing field and laboratory QC samples.

QC samples collected in the field will be preserved, handled, and transported in an identical manner as the environmental samples. QC samples will include the following:

- Field duplicates
- Field/Equipment blanks (if applicable for individual sites)
- Trip blanks (if applicable for individual sites)
- Matrix spikes and matrix spike duplicates (MS/MSDs)
- Laboratory method blanks
- Laboratory control samples (LCS)

Quality control samples are briefly described below.

Field Duplicate Samples. To evaluate sampling and laboratory precision, field duplicate samples may be collected, as specified in the site-specific SAP. One sample set will be labeled with the correct sample identification, while the other will be labeled with a false or “blind” sample identification. If the detected analytes in the field sample and its duplicate are less than 5 times the laboratory reporting limit (LRL) and the difference between the reported concentration in the sample and the reported concentration in the duplicate is less than or equal to the LRL value (for aqueous samples) or less than twice the LRL (for soil/solid samples), the samples will be considered within control. If the difference is greater than the LRL value, the data will be flagged and evaluated by the Consultant QA/QC Officer.

The relative percent difference (RPD) between detected analytes in the field sample and its duplicate are calculated when the reported concentrations for the sample and duplicate are greater than or equal to 5 times the LRL. The RPD is calculated to evaluate precision using the following equation.

RPD = $\frac{X_1 - X_2}{\left(\frac{X_1 + X_2}{2}\right)} x100$ Where X_1 and X_2 are the reported concentrations of the samples being evaluated.

The target RPD values for samples and their duplicates will be ±25% (for aqueous samples) and ±50% (for solid samples, due to greater sample heterogeneity). If samples exceed the target RPD values, the data will be flagged and evaluated by the Consultant QA/QC Officer. The samples may be used on a conditional basis if sample heterogeneity or matrix interference appears to be the cause of the high RPD value.

Field/Equipment Blank. Field equipment blanks may be collected, as specified in the site-specific SAP. Acceptance criteria will be analyte concentrations less than the LRLs. If above the LRLs, the data will be flagged and evaluated by the Consultant QA/QC Officer. The Consultant QA/QC Officer will review the sampling procedures and equipment to determine if contaminants could have been introduced by the sampling methodology. When necessary, the results will be discussed with the Agencies, laboratory personnel, and/or appropriate regulatory officials to determine if the data are acceptable or should be rejected.

Trip Blanks. Trip blanks will apply only when a Phase II ESA includes collection of samples to be analyzed for volatile organic compounds (VOCs) and will be used to evaluate whether external VOCs from bottle handling and analytical processes, independent of the field sampling processes, are contaminating the samples. Trip blanks will be prepared by the laboratory with analyte-free water prior to the sampling event, kept with the investigative samples throughout the sampling event, and returned to the laboratory with the other samples for analysis. One trip blank will typically be used and analyzed per site where sample analyses will include VOCs.

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Samples. Samples for MS/MSD analyses will be selected by the laboratory from the sample set at random and split in the laboratory. The MS/MSD samples will be spiked in the laboratory with target analytes prior to extraction or analysis, according to the laboratory's SOPs, and then analyzed for the same compounds as the environmental samples. Each MS/MSD will be evaluated for Percent Recovery (PR). If the data meets the PR criteria, the MS/MSD will be evaluated for RPD according to the equation presented above.

Percent Recovery = $\frac{X_s - X_i}{SC} x100$ Where X_s = concentration measured in spiked sample
X_i = concentration measured prior to spiking, and
SC = spike concentration

The PR acceptance criteria for MS/MSD samples will vary by sample medium, analyte, and analytical method, and may be either method defaults or laboratory-derived. Laboratory RPD acceptance criteria also vary by sample medium, analyte, and analytical method, and are specified in the ESC QAM (**Appendix A** of this QAPP). Each laboratory report will include quality control summaries with PR results and comparison against PR acceptance criteria for each sample medium, analyte, and analytical method for that sample set. If data fail to meet the

acceptance criteria, the Consultant QA/QC Officer will evaluate the data with the laboratory to determine potential causes of failure, such as matrix interference or sample heterogeneity. Data may be flagged or invalidated based on discussions with the laboratory.

Laboratory Method Blanks. Method blank samples will be prepared by the laboratory and analyzed with each analytical batch for each method. A method blank consists of laboratory-grade deionized water or solid that is processed through all of the analytical steps required by a method, including sample extraction, preparation, and analysis. Laboratory method blank samples are used to identify contamination originating in the laboratory, such as laboratory water, reagents, sample preparation steps, and instrument contamination. Method blank samples aid in distinguishing low-level field contamination from laboratory contamination. Method blank samples will be run with each batch of samples (20 or fewer samples per batch). If analytes are detected in the method blank, the laboratory will correct problems as per their SOPs.

Laboratory Control Samples (LCS). Laboratory control samples are used to evaluate laboratory accuracy in the absence of matrix interference. A laboratory control sample is composed of laboratory-grade deionized water or clean solid that is spiked with target analytes according to the laboratory's SOPs prior to extraction or analysis. The percent recovery of the spiked compounds is calculated and compared to established QC limits using the following formula.

Percent Recovery = $\frac{X_S}{SC} x 100$ Where X_S = concentration measured in spiked sample, and SC = spike concentration

Acceptance criteria for the LCS will vary by sample medium, analyte, and analytical method; may be either method defaults or laboratory-derived; and are compared against PR results in the laboratory quality control summaries provided as part of each laboratory report. If the LCS is out of control, the laboratory will correct problems in accordance with its standard operating procedures.

Holding Times. Holding times are used to evaluate the representativeness of the environmental samples. Holding time is the period following sample collection when a sample is considered representative of the environmental conditions. The holding time for each analysis will be compared to the method-specific holding times. Samples held beyond their holding time prior to analysis will be rejected.

B5.2 Non-definitive data

Non-definitive data utilized to support decisions may include field soil screening measurements and observations, physical observations, and groundwater field parameter measurements. Non-definitive data will be collected following Terracon SOPs **(Appendix B)**. The QC documentation for non-definitive data is not as rigorous as requirements for definitive data.

B6 Equipment Testing, Inspection, and Maintenance Requirements

Testing, inspection, and maintenance of sampling equipment and field instrumentation will be performed by Terracon field personnel prior to each day's field use and in accordance with the procedures and schedules in the manufacturers' specifications. A supply of appropriate spare parts and batteries will be maintained with each instrument in its transport case, along with instrument calibration supplies. Any identified deficiencies will be documented in the field log book, along with any corrective actions (e.g., spare parts replacement and instrument re-testing) and effectiveness of corrective actions.

ESC conducts its own equipment testing, inspections, maintenance, and record keeping of the laboratory equipment as detailed in the laboratory's QAM provided in **Appendix A**.

B7 Instrument/Equipment Calibration and Frequency

B7.1 Field Instruments

Field instruments will be calibrated daily or in accordance with manufacturers' specifications by Terracon field personnel, using National Institute of Standards and Technology (NIST) standards or equivalent. Calibration deficiencies, if any, will be documented in the field log book along with their resolution (e.g., spare parts replacement and re-calibration).

B7.2 Laboratory Instruments

ESC's QAM and SOPs meet all State of Utah, The NELAC Institute, and EPA method protocols necessary to produce legally and defensible analytical data, as indicated in the Utah Environmental Laboratory Certification Program (ELCP) document. Certification also applies to instrument calibration, reference material, standards traceability, data validation, and all other aspects of ESC's QAM.

In the event of a negative audit finding or any other circumstance, which raises doubt concerning the laboratory's competence or compliance with required procedures, the laboratory ensures that those areas of concern are quickly investigated. A resolution of the situation is promptly sought and, where necessary, recalibration and retesting is conducted. Records of events and corrective actions taken by the laboratory to resolve issues and to prevent further occurrences are maintained. Additional information on laboratory corrective actions is described in Section 4.11 of ESC's QAM.

B8 Inspection/Acceptance Requirements for Supplies and Consumables

Sample containers and other dedicated consumables will meet EPA criteria for cleaning procedures required for low-level chemical analysis. Sample containers will have Level II certification provided by the manufacturer, in accordance with pre-cleaning criteria established by EPA in "*Specifications and Guidelines for Obtaining Contaminant-Free Sample Containers*."

The certificates of cleanliness are maintained by the container suppliers, and can be obtained upon request using the container batch and lot numbers. Sample containers and sample preservatives (where applicable) will be provided by the laboratory. The containers shall be pre-preserved by the laboratory, if required. In addition, the laboratory will supply the laboratory-grade deionized water for the field and equipment blanks. The laboratory-grade deionized water may be prepared by the laboratory in-house, but the laboratory must have a routine procedure in place to analyze the water to ensure the deionized water's quality. New disposable nitrile sampling gloves will be used during collection of samples, and will be discarded after collection of each sample. New disposable water filters (if required), bailers, and/or tubing will be used to collect groundwater samples and will be discarded after use. Prior to use, the materials provided by the laboratory or other suppliers will be inspected visually for signs of tampering, contamination, or damage. No evidence of tampering, contamination, or damage will be acceptable. The field team leader will be responsible for the inspection. Reserves of field supplies and consumables are stored and maintained in Terracon's secured storage warehouse and used as needed by field personnel for each day's field activities, and the reserves of consumables are re-ordered/replenished as needed by Terracon staff.

B9 Data Acquisition of Non-direct Measurements

Additional data may be collected and used for site characterization following SOPs. QA procedures will be followed throughout the investigation. External sources of existing data may also be used (for example, computer databases or regulatory files of previously investigated sites); such information will be used only for reference. This type of data will be considered non-definitive for the purpose of assessing selected sites, unless the data was collected following an Agency-approved SAP, evaluated following a QAPP that meets or exceeds the requirements provided in this QAPP, validated, and deemed definitive.

B10 Data Management

The results of each investigation will be compiled and detailed in a report. Please refer to Section A9 for information pertaining to documentation that will be generated during the course of the project, and storage requirements for these records.

Data will be processed using commercially available word processing, spreadsheet, and/or database programs. During transcription of field measurements, each entry will be double-checked immediately after each transcription from field log books and forms. Example forms for typical field data collection are included in **Appendix B**. To minimize potential errors in laboratory data transcription, the use of electronic data deliverables (EDDs) will be maximized during data entry to summary tables and databases. The control mechanism to detect and correct possible errors in data transcription, reduction, reporting, and data entry to forms, reports, and databases will be the senior peer review of documents by the Consultant Project Manager and Consultant QA/QC Officer. Data will be stored electronically, both on a local server hard drive (subject to daily backup on a separate file server at Terracon's corporate office

in Olathe, KS) and on the laboratory's LIMS database system, and can be retrieved via the local server and via the laboratory's secured online data access system. Please refer to **Appendix A** (ESC QAM) for information relating to procedures used and individuals responsible for laboratory data processing, transmittal, storage/archival, and hardware/software configurations.

GROUP C ASSESSMENT/OVERSIGHT

C1 Assessment Activities

Assessment and oversight activities will be conducted by the Consultant QA/QC Officer. There will be three primary activities conducted by the Consultant QA/QC Officer:

1) Surveillance Level Oversight

The Consultant Project Manager will coordinate the investigation, with independent oversight by the Consultant QA/QC Officer. Both of these individuals will have authority to stop work in the event of unsafe work conditions or deviation from SOPs. In the event of unsafe work conditions, field personnel will also have authority to stop work and will immediately contact the Consultant Project Manager for resolution. Any deviations from the QAPP will be addressed immediately to ensure the quality of the data. Surveillance level oversight will be conducted throughout the duration of field activities.

2) Performance Evaluations

The Consultant QA/QC Officer will verify that the laboratory certifications and methods are current and approved by the NELAP, prior to the initiation of field sampling.

3) Data Quality Validation Summary

Within approximately one week of receipt of analytical data sets from the laboratory, the Consultant Project Manager will perform an initial review of the data, followed by a data validation review by the Consultant QA/QC Officer to determine whether DQOs were met and evaluate the overall usability of the data. The results of these data validation reviews will be communicated to the Consultant Project Manager, who will immediately notify the laboratory if any need for corrective actions is identified. In this case, the laboratory will be required to perform and verify any corrective actions taken, which will then be documented in an amended laboratory report identifying the corrective actions taken and any resulting changes to the analytical results. In addition, the data validation reviews will form the basis for development of data validation summaries for inclusion with the final site investigation reports.

C2 Reports to Management

Data validation summaries will be included as part of the final reports detailing the investigations. In the event that laboratory corrective actions are required, the Consultant Project Manager will notify Salt Lake County, and final reports will include copies of both the

original and amended laboratory reports. In the event that field corrective actions are required, the problem and corrective action will be recorded in the field log book, and will also be documented in the final report. Copies of the final reports detailing the investigations will be sent to all parties listed in **Section A3 Distribution List**.

GROUP D DATA VALIDATION AND USABILITY

D1 Data Review

Following receipt of the laboratory analytical results and initial review by the Consultant Project Manager, the data will be forwarded to the Consultant QA/QC Officer for review which will include initial screening to evaluate whether any of the data is flagged or if laboratory control limits were not met. Upon acceptance of the data from the laboratory, the data will be validated. The data validation process evaluates whether the specific requirements for an intended use have been fulfilled and ensures that the results conform to the users' needs.

D2 Validation and Verification Methods

All laboratory data will be subject to internal reduction and validation by the laboratory prior to external release of the data, as detailed in the laboratory's QAM (Section 12 of the QAM Appendices IV through XIII) in **Appendix A**.

Following receipt of data released by the laboratory, additional data validation and verification will be conducted by the Consultant QA/QC Officer, using the criteria described in **Section B5.1** and **Table 2**, and including review of chain of custody and laboratory log-in records. Data will be reviewed as it is received throughout the project. Each laboratory data set will be provided by the laboratory as a Level III data package which will include the final analytical report with qualifiers where necessary; chain of custody records; and results for method blanks, MS/MSD analyses with control limits; LCS summary with control limits; reporting limits listed on all reports; surrogate recoveries for GC and GC/MS analyses; initial and continuing calibration information; and instrument blank performance.

Laboratory QC issues will be addressed by communication between the Consultant QA/QC Officer and laboratory personnel. Problems identified in sample collection, handling, preservation, and documentation will be addressed with the Consultant Project Manager and field staff.

Any deviations from the QA goals will be evaluated in terms of their effect on data usability. The degree of sample deviation beyond the acceptance limit will be evaluated for its potential effect on data usability, contribution to the quality of the reduced and analyzed data, and on decision-making for the project.

D3 Reconciliation with User Requirements

Following the validation of field and laboratory data, all data and information will be reconciled with the project objectives to assess the overall success of sampling activities. Qualitative DQOs will be reviewed through a narrative discussion of the results to including limitations, if any, on data use due to uncertainties posed by any flagged data or elevated laboratory reporting limits. If such uncertainties result in significant hindrances to data usability, practical followup actions (for example, limited resampling) may be recommended as warranted.

GROUP E REFERENCES

U.S. Environmental Protection Agency. *Guidance for Preparing Standard Operating Procedures (SOPs) (QA/G-6)*. EPA/600/B-07/001, April, 2007

U.S. Environmental Protection Agency. *Data Quality Assessment: A Reviewer's Guide (QA/G-9R)*. EPA/240/B-06/003, February, 2006.

U.S. Environmental Protection Agency. *Data Quality Assessment: Statistical Tools for Practitioners (QA/G-9S)*. EPA/240/B-06/002, February, 2006.

U.S. Environmental Protection Agency. *Guidance for Quality Assurance Project Plans (QA/G-5)*. EPA/240/R-02/009, December, 2002.

U.S. Environmental Protection Agency. *Guidance on Systematic Planning Using the Data Quality Objectives Process (QA/G-4)*. EPA/240/B-06/001, February, 2006.

U.S. Environmental Protection Agency. *Data Quality Objectives Process for Superfund – Interim Final Guidance.* Pub. No. 9355-9-01, September, 1993.

U.S. Environmental Protection Agency. *Regional Screening Levels (RSLs)*. www.epa.gov/risk/regional-screening-levels-rsls

U.S. Environmental Protection Agency. National Primary Drinking Water Regulations. www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations

Utah Department of Environmental Quality. *Standards: Utah Ground Water Quality Protection Program.* www.deq.utah.gov/ProgramsServices/programs/water/groundwater/standards.htm

Utah Department of Environmental Quality. *Summary of Groundwater and Soil Cleanup Screening Levels.* www.deq.utah.gov/ProgramsServices/programs/tanks/lust/docs/2006/08Aug/cleanupLevels.pdf

Table 1
Data Quality Indicators (DQIs)

Parameter	QC Program	Evaluation Criteria	Summary of QA/QC Goals
Precision	Field Duplicate Pairs	RPD[a]	RPDs will be less than ± 25% (aqueous samples) and ± 50% (solid samples) when detected concentrations are ≥ 5x the LRL. When detected concentrations are <5x the LRL and the difference between the reported concentrations is less than or equal to the LRL value (for aqueous samples) or less than twice the LRL (for soil/solid samples), the samples will be considered within control.
Bias	Laboratory Control Sample	Percent Recovery[b]	LCS percent recoveries will vary by sample medium, analyte, and method, and may be either method defaults or laboratory-derived.
	Matrix Spike/Matrix Spike Duplicate (MS/MSD)	Percent Recovery[b] RPD[a]	MS/MSD percent recoveries and RPDs will vary by sample medium, analyte, and method, and may be either method defaults or laboratory-derived.
Accuracy[c]	Method Blanks	LRL	Less than LRL
	Equipment Blanks	LRL	Less than LRL
Representativeness	Standard Operating Procedures (SOPs)	Qualitative determination of SOP adherence	All samples collected following SOPs
	Holding Times	Holding Times	All samples analyzed within holding times
	Field/Equipment Blanks	LRL	Less than LRL
Comparability	Units of Measure	Metric Units	100% of sample results reported in same units
	Analytical Methods	Approved Methods	100% of samples analyzed using approved methods
	Standardized Sampling	Qualitative determination of SOP adherence	All samples collected following SOPs
	QC Samples 10% Field Duplicates 10% Field Blanks Lab QA	 Verify Verify Verify	 100% compliance 100% compliance 100% compliance
Completeness	Complete Sampling	Percent Valid Data	90% or more of the planned measurements are valid
Sensitivity	Sample analyses	LRL	100% of LRLs are less than Performance Standards

a: RPD = $\frac{X_1-X_2}{\left(\frac{X_1+X_2}{2}\right)}x100$; where X_1 and X_2 are the reported concentrations of the samples being evaluated.

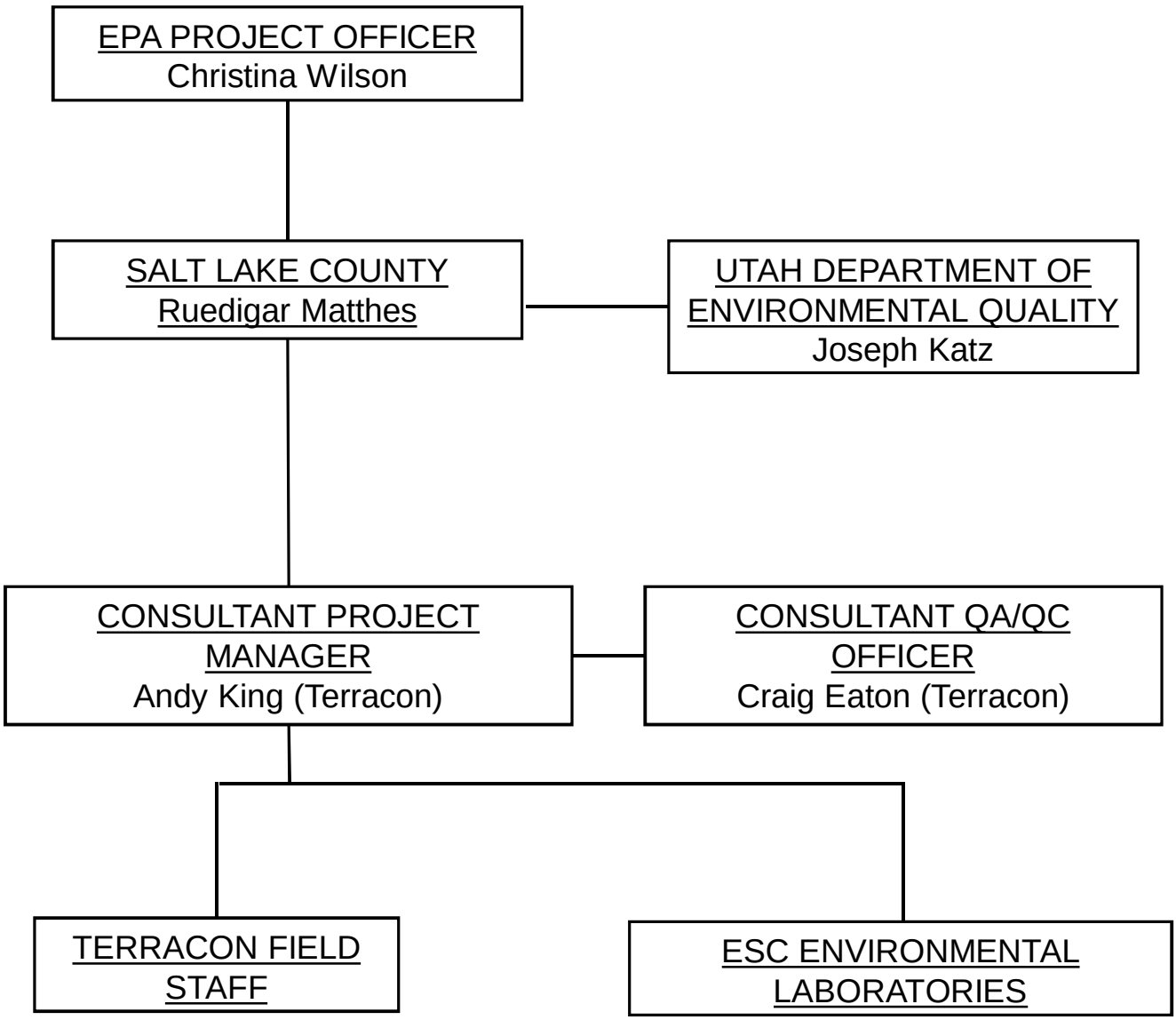
b: Percent Recovery = $\frac{X_s-X_i}{SC}x100$; where X_s = concentration measured in spiked sample, X_i = concentration measured prior to spiking, and SC = spike concentration.

c: Instrument calibration, reference material, standards traceability, and data validation will follow ESC's Standard Operating Procedures.

LRL - Laboratory Reporting Limit
RPD - Relative Percent Difference
SOP - Standard Operating Procedure

Table 2
Data Validation and Verification Methods

Data Validation and Verification Requirements	Data Validation and Verification Methods
n Samples were collected as per scheduled locations and frequency.	n Comparison with Sampling & Analysis Plans.
n Sample collection and handling followed specific procedures (i.e., relevant SOPs and chain of custody procedures).	n Review of field notes, sampling logs and COCs. n Surveillance-level oversight of field procedures to maximize consistency in field.
n Appropriate analytical methods were used, and internal laboratory calibration checks were performed according to the method-specified protocol.	n Review of analytical methods and case narratives provided with laboratory reports. n Maintain documentation of communications with laboratory regarding problems or corrective actions.
n Required holding times and laboratory reporting limits were met.	n Comparison with specified holding times and LRLs.
n Recovery acceptance limits for field and laboratory QC samples (MS/MSD, LCS, and method blanks) were met.	n Comparison with specified acceptance limits. n Comparison with Data Quality Indicators.
n Appropriate steps were taken to ensure the accuracy of data reduction, including reducing data transfer errors in the preparation of summary data tables and maps.	n Maintaining a permanent file of hard copies of laboratory analytical reports. n Minimizing retyping of data. n Double-checking values entered into database, tables, and maps against laboratory reports.



Project Manager: ARK	Project No.: 61177082	Terracon Consulting Engineers & Scientists	PROJECT ORGANIZATION CHART
Drawn By: ARK	Scale: NA	6949 South High Tech Drive Midvale, Utah 84047	SALT LAKE COUNTY BROWNFIELDS ASSESSMENT
Checked By: CDE	File Name: F1 Org Chart	PH. (801) 545-8500 FAX. (801) 545-8600	Salt Lake County, Utah
Approved By:: CDE	Date: 05/24/18		FIGURE 1

APPENDIX A

ESC Laboratories Quality Assurance Manual

Quality Assurance Manual

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Version 15.0 8/1/16

COMPREHENSIVE QUALITY ASSURANCE MANUAL

for

ESC LAB SCIENCES
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Prepared by

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NOTE: This QAM has been approved by the following people.

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The ESC QAM has been prepared in accordance with the following standards: AIHA-LAP, A2LA, ISO/IEC 17025-2005, 2003 NELAC Standard, 2009 TNI Standard, and DOD QSM.

Disclaimer

This Quality Assurance Manual for ESC Lab Sciences is a living document. It is reviewed at least annually and revised when needed. The information stated herein is subject to change at any time due to updates to QC Limits, methods, operations, equipment, staff, etc.

Quality Manual: Table of Contents

Tables and Figures

1.0 GENERAL PURPOSE OF THIS QUALITY MANUAL

This quality manual documents the laboratory's management system and demonstrates the ability to execute the indicated tests and/or procedures and to meet regulatory requirements.

This manual establishes laboratory compliance with ISO (International Organization for Standardization) 17025, The NELAC Institute (TNI), Department of Defense Quality Systems Manual (DOD QSM), and the American Industrial Hygiene Association Laboratory Accreditation Program (AIHA-LAP).

2.0 LABORATORY BACKGROUND

2.1 ACTIVITIES

2.1.1 Analytical Support and Service Areas

ESC Lab Sciences is an environmental analytical firm providing technical and support services to customers nationwide. Specific service areas include the following:

- drinking water analysis
- industrial wastewater analysis
- hazardous waste characterization and identification
- groundwater analysis
- air analysis
- regulatory document guidance
- biological assessments
- mold identification
- solid/soil analysis and characterization
- industrial hygiene/environmental lead
- aquatic toxicity analysis
- cryptosporidium/giardia

2.1.2 Regulatory Compliance and Quality Standards

ESC is devoted to providing reliable and accurate data recognizing the necessity to establish sound, objective, and legally defensible positions or opinions for customers regarding compliance with governing regulations. ESC maintains quality systems that are compliant with the following Quality Standards: AIHA-LAP, A2LA, ANSI/ISO/IEC 17025, The TNI Standard, DOD QSM. The effectiveness of the quality system is measured by accreditation maintenance, internal and external audits, management reviews, proficiency sample testing, and an active preventive/corrective action system.

2.1.3 Analytical Capabilities:

Where mandated, only approved procedures are used for environmental analyses. ESC utilizes a number of method sources to accomplish project requirements. For NPDES and SDWA, methodologies are taken directly from 40 CFR parts 136 and 141.

For industrial hygiene analytical procedures, ESC utilizes guidance from NIOSH and OSHA published methods.

The following list is an example of the methodology ESC routinely performs:

Routine Methodology and Programs	
PROGRAM	***METHOD SOURCE***
NPDES	*EPA 821/R-93-010-A* *Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater, Volume I. Revision 1, August 1993.*
	40 CFR part 136
	Methods for Chemical Analysis of Water and Wastes (March 1983)
	Standard Methods for the Examination of Water and Wastewater (20ththrough 22nd editions)
AQUATIC TOXICITY	*7-Day Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test; Test Method 1000.0 from "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA 821-R-02-013).*
	3-Brood Ceriodaphnia dubia Survival and Reproduction Test; Test Method 1002.0 from "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA 821-R-02-013).
	Fathead Minnow (Pimephales promelas) Acute Toxicity Test (24, 48 or 96 hour duration); referenced in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA 821-R-02-012, 10-02).
	Ceriodaphnia dubia Acute Toxicity Test (24, 48 or 96 hour duration); referenced in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA 821-R-02-012, 10-02).
SDWA	40 CFR parts 141
	Methods for Chemical Analysis of Water and Wastes (March 1983)
	Standard Methods for the Examination of Water and Wastewater (20ththrough 22nd editions)
	Methods for the Determination of Organic Compounds in Drinking Water - EPA/600/4-88/039 - December 1988 (Revised July 1991)
	Methods for the Determination of Organic Compounds in Drinking Water Supplement I, EPA/600/4-90/020 - July 1990
	Methods for the Determination of Organic Compounds in Drinking Water Supplement II, EPA/600/R-92/129 - August 1992
	EPA. Method 1622: *Cryptosporidium in Water by Filtration/IMS/FA, December 2005.*
	EPA. Method 1623: *Cryptosporidium and Giardia in Water by Filtration/IMS/FA, December 2005.*
RCRA	*SW-846, Test Methods for Evaluating Solid Wastes (3rd, 4th and online editions)*

Routine Methodology and Programs	
PROGRAM	***METHOD SOURCE***
AIR	*Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*
	Emission Measurement Center (Air Emissions Methods)
	NIOSH Manual of Analytical Methods (4th edition)
	Journal of Chromatographic Science, Vol. 36, May 1998.
	OSHA Sampling and Analytical Methods (online)
CLP	*USEPA CONTRACT LABORATORY PROGRAM - STATEMENT OF WORK FOR ORGANICS ANALYSIS Multi-Media, Multi-Concentration OLM04.3*
	USEPA CONTRACT LABORATORY PROGRAM - STATEMENT OF WORK FOR INORGANIC ANALYSIS Multi-Media, Multi-Concentration ILM05.3
MOLD	*American Industrial Hygiene Association*
Miscellaneous	*American Society for Testing and Materials (ASTM)*
	State Specific Methodologies from the following: *Florida, Oregon, Iowa, Washington, Texas, Arizona, Massachusetts, North Carolina, Louisiana, Missouri, Kansas, Wisconsin, Ohio*
Miscellaneous	*Analytical Methods for the Determination of Pollutants in Pharmaceutical Manufacturing Industry Wastewater, Revision A EPA-821-B-98-016 - July 1998 (Approved at 40 CFR Part 136, Not Approved at Part 141)*

2.2 HISTORY

ESC Lab Sciences was founded in 1970 by Dr. Arthur Schulert, a professor of Biochemistry at Vanderbilt University Medical School. The laboratory's first location was a 2,000 square foot building located in Mt. Juliet, TN.

ESC initially conducted several research contracts for the National Science Foundation. EPA Clean Water and Safe Drinking Water legislation of the early 1970s provided an additional market of Tennessee utilities and industries. ESC grew slowly for several years by increasing the share of the drinking and wastewater markets in Tennessee. In the late 1980s, ESC expanded its capabilities to include Underground Storage Tank testing and Biomonitoring/Toxicity testing.

Strategic expansion of the laboratory allowed ESC to provide support to large RCRA sites and add capabilities to offer analytical support for air and mold analyses. ESC is currently the nation's largest, single-location environmental laboratory operating in all US states. Our staff of over 300 employees works out of our 100,000 square feet, eleven-building facility approximately 20 minutes east of Nashville International Airport.

3.0 INTRODUCTION, SCOPE, AND DEFINITIONS

3.1 SCOPE OF CAPABILITIES

A list of approved and certified analytical capabilities can be found at the end of this section in Table 3.3b.

3.2 TABLE OF CONTENTS, REFERENCES AND APPENDICES

The table of contents is found at the beginning of this Manual. This Quality Manual uses the references from the 2003 NELAC Standard, Chapter 5, Appendix A and the 2009 TNI Standard (EL-V1M2-ISO-2009, Section 3.0).

3.3 DEFINITIONS AND TERMINOLOGY

The source of some of the definitions is indicated previous to the actual definition.

Table 3.3a Definitions

Acceptance Criteria	TNI and DoD- Specified limits placed on characteristics of an item, process, or service defined in requirement documents.
Accreditation	TNI and DoD- The process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory.
Accrediting Authority	DoD- The Territorial, State or Federal agency having responsibility and accountability for environmental laboratory accreditation and which grants accreditation.
Accrediting (or Accreditation) Body	DoD- Authoritative body that performs accreditation.
Accuracy	TNI and DoD- The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components that are due to sampling and analytical operations; a data quality indicator.
Aliquot	DoD- A discrete, measured, representative portion of a sample taken for analysis.
Analysis Sequence	A compilation of all samples, standards and quality control samples run during a specific amount of time on a particular instrument in the order they are analyzed.
Analyst	TNI and DoD- The designated individual who performs the “hands-on” analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality.
Analyte	DoD- The specific chemicals or components for which a sample is analyzed; it may be a group of chemicals that belong to the same chemical family, and which are analyzed together.
Analytical Reagent Grade	Designation for the high purity of certain chemical reagents and solvents assigned by the American Chemical Society.

Analytical Sensitivity	The lowest concentration that can be detected by the method. (e.g., for methods involving a count = 1 raw count calculated to the reporting units). Analytical sensitivity is commonly used in Mold analysis.
Analytical Uncertainty	TNI- A subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis.
Assessment	TNI - The evaluation process used to measure or establish the performance, effectiveness, and conformance of an organization and/or its system to defined criteria (to the standards and requirements of laboratory accreditation). DoD- The evaluation process used to measure the performance or effectiveness of a system and its elements against specific criteria. Note: In this standard (DoD), assessment is an all-inclusive term used to denote any of the following: audit, performance evaluation, peer review, inspection, or surveillance.
Atomic Absorption Spectrometer	Instrument used to measure concentration in metals samples.
Atomization	DoD- A process in which a sample is converted to free atoms.
Audit	TNI- A systematic and independent examination of facilities, equipment, personnel, training, procedures, record-keeping, data validation, data management, and reporting aspects of a system to determine whether QA/QC and technical activities are being conducted as planned and whether these activities will effectively achieve quality objectives. DoD- A systematic evaluation to determine the conformance to quantitative and qualitative specifications of some operational function or activity.
Batch	TNI and DoD- Environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A **preparation batch** is composed of one to 20 environmental samples of the same quality systems matrix, meeting the above-mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various quality system matrices and can exceed 20 samples.
Bias	TNI- The systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value).
Blank	TNI and DoD- A sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results.
Blind Sample	DoD- A sub-sample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. It is used to test the analyst's or laboratory's proficiency in the execution of the measurement process.
BNA (Base Neutral Acid compounds)	A list of semi-volatile compounds typically analyzed by mass spectrometry methods. Named for the way they can be extracted out of environmental samples in an acidic, basic or neutral environment.
BOD (Biochemical Oxygen Demand)	Chemical procedure for determining how fast biological organisms use up oxygen in a body of water.

Calibration	TNI and DoD- A set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards. 1) In calibration of support equipment, the values realized by standards are established through the use of reference standards that are traceable to the International System of Units (SI); 2) In calibration according to test methods, the values realized by standards are typically established through the use of Reference Materials that are either purchased by the laboratory with a certificate of analysis or purity, or prepared by the laboratory using support equipment that has been calibrated or verified to meet specifications.
Calibration Curve	TNI- The mathematical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response. DoD- The graphical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response.
Calibration Factor	The ratio of the detector response (peak areas or peak heights) to the amount (mass) of analyte in the calibration standard.
Calibration Method	DoD- A defined technical procedure for performing a calibration.
Calibration Range	DoD- The range of values (concentrations) between the lowest and highest calibration standards of a multi-level calibration curve. For metals analysis with a single-point calibration, the low-level calibration check standard and the high standard establish the linear calibration range, which lies within the linear dynamic range.
Calibration Standard	TNI- A substance or reference material used for calibration. DoD- A substance or reference material used to calibrate an instrument.
Certified Reference Material (CRM)	TNI- Reference material accompanied by a certificate, having a value, measurement uncertainty, and stated metrological traceability chain to a national metrology institute. DoD- A reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body.
Chain of Custody	DoD- An unbroken trail of accountability that verifies the physical security of samples, data, and records.
Chain of custody Form (COC)	TNI and DoD- Record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and type of containers; the mode of collection, the collector, time of collection; preservation; and requested analyses.
Chemical Oxygen Demand (COD)	A test commonly used to indirectly measure the amount of organic compounds in water.
Client (referred to by ISO as Customer)	DoD- Any individual or organization for whom items or services are furnished or work performed in response to defined requirements and expectations.
Code of Federal Regulations (CFR)	A codification of the general and permanent rules published in the Federal Register by agencies of the federal government.
Comparability	An assessment of the confidence with which one data set can be compared to another. Comparable data are produced through the use of standardized procedures and techniques.

Completeness	The percent of valid data obtained from a measurement system compared to the amount of valid data expected under normal conditions. The equation for completeness is: % Completeness = (Valid Data Points/Expected Data Points)*100
Confirmation	TNI and DoD- Verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to: second-column confirmation; alternate wavelength; derivatization; mass spectral interpretation; alternative detectors; or additional cleanup procedures.
Conformance	DoD- An affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements.
Congener	DoD- A member of a class of related chemical compounds (e.g., PCBs, PCDDs).
Consensus Standard	DoD- A standard established by a group representing a cross-section of a particular industry or trade, or a part thereof.
Continuing Calibration Blank (CCB)	A blank sample used to monitor the cleanliness of an analytical system at a frequency determined by the analytical method.
Continuing Calibration Check Compounds (CCC)	Compounds listed in mass spectrometry methods that are used to evaluate an instrument calibration from the standpoint of the integrity of the system. High variability would suggest leaks or active sites on the instrument column.
Continuing Calibration Verification	DoD- The verification of the initial calibration that is required during the course of analysis at periodic intervals. Continuing calibration verification applies to both external and internal standard calibration techniques, as well as to linear and non-linear calibration models.
Continuing Calibration Verification (CCV) Standard	Also referred to as a CVS in some methods, it is a standard used to verify the initial calibration of compounds in an analytical method. CCVs are analyzed at a frequency determined by the analytical method.
Continuous Emission Monitor (CEM)	A flue gas analyzer designed for fixed use in checking for environmental pollutants.
Contract Laboratory Program (CLP)	A national network of EPA personnel, commercial labs, and support contractors whose fundamental mission is to provide data of known and documented quality.
Contract Required Detection Limit (CRDL)	Detection limit that is required for EPA Contract Laboratory Program (CLP) contracts.
Contract Required Quantitation Limit (CRQL)	Quantitation limit (reporting limit) that is required for EPA Contract Laboratory Program (CLP) contracts.
Control Chart	A graphic representation of a series of test results, together with limits within which results are expected when the system is in a state of statistical control (see definition for Control Limit)
Control Limit	A range within which specified measurement results must fall to verify that the analytical system is in control. Control limit exceedances may require corrective action or require investigation and flagging of non-conforming data.
Corrective Action	DoD- The action taken to eliminate the causes of an existing non-conformity, defect, or other undesirable situation in order to prevent recurrence.

Corrective and Preventative Action (CAPA)	The primary management tools for bringing improvements to the quality system, to the management of the quality system's collective processes, and to the products or services delivered which are an output of established systems and processes.
Data Audit	DoD- A qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data are of acceptable quality (i.e. that they meet specified acceptance criteria).
Data Quality Objective (DQO)	Systematic strategic planning tool based on the scientific method that identifies and defines the type, quality, and quantity of data needed to satisfy a specified use or end user.
Data Reduction	TNI- The process of transforming the number of data items by arithmetic or statistical calculation, standard curves, and concentration factors, and collating them into a more usable form. DoD- The process of transforming raw data by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useable form.
Definitive Data	DoD- Analytical data of known quality, concentration and level of uncertainty. The levels of quality and uncertainty of the analytical data are consistent with the requirements for the decision to be made. Suitable for final decision-making.
Demonstration of Capability	TNI- A procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision. DoD- A procedure to establish the ability of the analyst to generate acceptable accuracy.
Detection Limit (DL)	DoD- The smallest analyte concentration that can be demonstrated to be different than zero or a blank concentration at the 99% level of confidence. At the DL, the false positive rate is 1%.
Diesel Range Organics (DRO)	A range of compounds that denote all the characteristic compounds that make up diesel fuel (range can be state or program specific).
Digestion	DoD- A process in which a sample is treated (usually in conjunction with heat) to convert the sample to a more easily measured form.
Document Control	DoD- The act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed.
Dry Weight	The weight after drying in an oven at a specified temperature.
Duplicate (also known as Replicate or Laboratory Duplicate)	DoD- The analyses or measurements of the variable of interest performed identically on two subsamples of the same sample. The results of duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory.
Electron Capture Detector (ECD)	Device used in GC methods to detect compounds that absorb electrons (e.g., PCB compounds).
Electronic Data Deliverable (EDD)	A summary of environmental data (usually in spreadsheet form) which customers request for ease of data review and comparison to historical results.
Eluent	DoD- A solvent used to carry the components of a mixture through a stationary phase.
Elute	DoD- To extract, specifically, to remove (absorbed material) from an absorbent by means of a solvent.
Elution	DoD- A process in which solutes are washed through a stationary phase by movement of a mobile phase.

Environmental Data	DoD- Any measurements or information that describe environmental processes, locations, or conditions; ecological or health effects and consequences; or the performance of environmental technology.
Environmental Monitoring	DoD- The process of measuring or collecting environmental data.
Environmental Sample	A representative sample of any material (aqueous, non-aqueous, or multimedia) collected from any source for which determination of composition or contamination is requested or required. Environmental samples can generally be classified as follows: • Air and Emissions – Gas or vapor collected in Tedlar bags, SUMMA canisters, sorbant tubes, impingers, filters, or other devices. • Non Potable Water (Includes surface water, ground water, effluents, water treatment chemicals, and TCLP leachates or other extracts) • Drinking Water - Delivered (treated or untreated) water designated as potable water • Water/Wastewater - Raw source waters for public drinking water supplies, ground waters, municipal influents/effluents, and industrial influents/effluents • Sludge - Municipal sludges and industrial sludges. • Soil - Predominately inorganic matter ranging in classification from sands to clays. • Waste - Aqueous and non-aqueous liquid wastes, chemical solids, and industrial liquid and solid wastes
Equipment Blank	A sample of analyte-free media used to rinse common sampling equipment to check effectiveness of decontamination procedures.
External Calibration Model	Comparison of instrument responses from the sample to the responses from the target compounds in the calibration standards. Sample peak areas (or peak heights) are compared to peak areas (or heights) of the corresponding analytes in calibration standards.
Facility	A distinct location within the company that has unique certifications, personnel and waste disposal identifications.
False Negative	DoD- An analyte incorrectly reported as absent from the sample, resulting in potential risks from their presence.
False Positive	DoD- An item incorrectly identified as present in the sample, resulting in a high reporting value for the analyte of concern.
Field Blank	A blank sample prepared in the field by filling a clean container with reagent water and appropriate preservative, if any, for the specific sampling activity being undertaken.
Field Measurement	Determination of physical, biological, or radiological properties, or chemical constituents that are measured on-site, close in time and space to the matrices being sampled/measured, following accepted test methods. This testing is performed in the field outside of a fixed-laboratory or outside of an enclosed structure that meets the requirements of a mobile laboratory.
Field of Accreditation	TNI- Those matrix, technology/method, and analyte combinations for which the accreditation body offers accreditation.

Finding	TNI- An assessment conclusion referenced to a laboratory accreditation standard and supported by objective evidence that identifies a deviation from a laboratory accreditation standard requirement. DoD- An assessment conclusion that identifies a condition having a significant effect on an item or activity. An assessment finding may be positive or negative and is normally accompanied by specific examples of the observed condition. Note: For DoD, the finding must be linked to a specific requirement.
Flame Atomic Absorption Spectrometer (FAA)	Instrumentation used to measure the concentration of metals in an environmental sample based on the fact that ground state metals absorb light at different wavelengths. Metals in a solution are converted to the atomic state by use of a flame.
Flame Ionization Detector (FID)	A type of gas detector used in GC analysis where samples are passed through a flame which ionizes the sample so that various ions can be measured.
Gas Chromatography (GC)	Instrumentation which utilizes a mobile carrier gas to deliver an environmental sample across a stationary phase with the intent to separate compounds out and measure their retention times.
Gas Chromatograph/ Mass Spectrometry (GC/MS)	In conjunction with a GC, this instrumentation utilizes a mass spectrometer which measures fragments of compounds and determines their identity by their fragmentation patterns (mass spectra).
Gasoline Range Organics (GRO)	A range of compounds that denote all the characteristic compounds that make up gasoline (range can be state or program specific).
Graphite Furnace Atomic Absorption Spectrometry (GFAA)	Instrumentation used to measure the concentration of metals in an environmental sample based on the absorption of light at different wavelengths that are characteristic of different analytes.
High Pressure Liquid Chromatography (HPLC)	Instrumentation used to separate, identify and quantitate compounds based on retention times which are dependent on interactions between a mobile phase and a stationary phase.
Holding Time	TNI- The maximum time that can elapse between two specified activities. 40 CFR Part 136- The maximum time that samples may be held prior to preparation and/or analysis as defined by the method and still be considered valid or not compromised. For sample prep purposes, hold times are calculated using the time of the start of the preparation procedure. DoD- The time elapsed from the time of sampling to the time of extraction or analysis, or from extraction to analysis, as appropriate.
Homogeneity	The degree to which a property or substance is uniformly distributed throughout a sample.
Homologue	DoD- One in a series of organic compounds in which each successive member has one more chemical group in its molecule than the next preceding member. For instance, methanol, ethanol, propanol, butanol, etc., form a homologous series.
Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)	Analytical technique used for the detection of trace metals which uses plasma to produce excited atoms that emit radiation of characteristic wavelengths.

Inductively Coupled Plasma- Mass Spectrometry (ICP/MS)	An ICP-AES that is used in conjunction with a mass spectrometer so that the instrument is not only capable of detecting trace amounts of metals and non-metals but is also capable of monitoring isotopic speciation for the ions of choice.
Infrared Spectrometer (IR)	An instrument that uses infrared light to identify compounds of interest.
Initial Calibration (ICAL)	The process of analyzing standards, prepared at specified concentrations, to define the quantitative response relationship of the instrument to the analytes of interest. Initial calibration is performed whenever the results of a calibration verification standard do not conform to the requirements of the method in use or at a frequency specified in the method.
Initial Calibration Blank (ICB)	A blank sample used to monitor the cleanliness of an analytical system at a frequency determined by the analytical method. This blank is specifically run in conjunction with the Initial Calibration Verification (ICV) where applicable.
Initial Calibration Verification (ICV)	DoD- A standard obtained or prepared from a source independent of the source of the standards for the initial calibration. Its concentration should be at or near the middle of the calibration range. It is done after the initial calibration.
Inspection	DoD- An activity such as measuring, examining, testing, or gauging one or more characteristics of an entity and comparing the results with specified requirements in order to establish whether conformance is achieved for each characteristic.
Instrument Blank	DoD- A clean sample (e.g., distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination.
Instrument Detection Limits (IDLs)	Limits determined by analyzing a series of reagent blank analyses to obtain a calculated concentration. IDLs are determined by calculating the average of the standard deviations of three runs on three non-consecutive days from the analysis of a reagent blank solution with seven consecutive measurements per day.
Interference, spectral	DoD- Occurs when particulate matter from the atomization scatters incident radiation from the source or when the absorption or emission from an interfering species either overlaps or is so close to the analyte wavelength that resolution becomes impossible.
Interference, chemical	DoD- Results from the various chemical processes that occur during atomization and later the absorption characteristics of the analyte.
Interference Check Sample (ICS)	A series of two solutions, used in ICP and ICPMS analysis, to verify that inter-element interferences are compensated for correctly. This standard is referred to as the Spectra Interference Check (SIC) in EPA Method 200.7 • ICSA – A solution containing only the interfering analytes at high concentrations. • ICSAB – A solution containing interferents plus other method analytes at the level of concern, which corresponds to the project specific action limits. ICSA and ICSAB provide an adequate test of inter-element correction (IEC) factors.
Internal Calibration Model	Internal standard calibration involves the comparison of instrument responses from the target compounds in the sample to the responses of specific internal standard analytes added to the sample or sample extract prior to injection.
Internal Standards	TNI and DoD- A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method.
Intermediate Standard Solution	Reference solutions prepared by dilution of the stock solutions with an appropriate solvent.

International System of Units (SI)	DoD- The coherent system of units adopted and recommended by the General Conference on Weights and Measures.
Ion Chromatography (IC)	Instrumentation or process that allows the separation of ions and molecules based on the charge properties of the molecules.
Isomer	DoD- One of two or more compounds, radicals, or ions that contain the same number of atoms of the same element but differ in structural arrangement and properties. For example, hexane (C6H14) could be n-hexane, 2-methylpentane, 3-methylpentane, 2,3-dimethylbutane, 2,2-dimethylbutane.
Laboratory	DoD- A body that calibrates and/or tests.
Laboratory Control Sample (LCS)	TNI and DoD- (however named, such as laboratory fortified blank, spiked blank, or QC check sample): A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes and taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a reference method. It is generally used to establish intra-laboratory or analyst-specific precision and bias or to evaluate the performance of all or a portion of the measurement system.
Laboratory Duplicate	DoD- Aliquots of a sample taken from the same container under laboratory conditions and processed and analyzed independently.
Laboratory Information Management System (LIMS)	A computer system that is used to maintain all sample information from sample receipt, through preparation and analysis and including sample report generation.
Legal Chain-of-Custody Protocols	TNI- Procedures employed to record the possession of samples from the time of sampling through the retention time specified by the customer or program. These procedures are performed at the special request of the customer and include the use of a Chain-of-Custody Form that documents the collection, transport, and receipt of compliance samples by the laboratory. In addition, these protocols document all handling of the samples within the laboratory.
Limit(s) of Detection (LOD)	TNI- A laboratory's estimate of the minimum amount of an analyte in a given matrix that an analytical process can reliably detect in their facility. DoD- The smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate is 1%.
Limit(s) of Quantitation (LOQ)	TNI- The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. DoD- The lowest concentration that produces a quantitative result within specified limits of precision and bias. For DoD projects, the LOQ shall be set at or above the concentration of the lowest initial calibration standard.
Lot	A quantity of bulk material of similar composition processed or manufactured at the same time.
Management	DoD- Those individuals directly responsible and accountable for planning, implementing, and assessing work.
Management System	DoD- System to establish policy and objectives and to achieve those objectives.
Manager (however named)	DoD- The individual designated as being responsible for the overall operation, all personnel, and the physical plant of the environmental laboratory. A supervisor may report to the manager. In some cases, the supervisor and the manager may be the same individual.

Matrix	TNI and DoD- The substrate of a test sample. For information is provided in the definition of Quality System Matrix below.
Matrix Duplicate	TNI- A replicate matrix prepared in the laboratory and analyzed to obtain a measure of precision.
Matrix Spike (MS) (spiked sample or fortified sample)	TNI- A sample prepared, taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a referenced method, by adding a known amount of target analyte to a specified amount of sample for which an independent test result of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency. DoD- A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.
Matrix Spike Duplicate (MSD) (spiked sample or fortified sample duplicate)	TNI and DoD- A replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte.
Measurement System	TNI and DoD- A test method, as implemented at a particular laboratory, and which includes the equipment used to perform the test and the operator(s).
Method	TNI- A body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed.
Method Blank	TNI and DoD- A sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses.
Method Detection Limit (MDL)	DoD- One way to establish a Detection Limit; defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.
Method Quantitation Limit (MQL)	TX TRRP - The lowest non-zero concentration standard in the laboratory's initial calibration curve and is based on the final volume of extract (or sample) used by the laboratory.
Method of Standard Additions	DoD- A set of procedures adding one or more increments of a standard solution to sample aliquots of the same size in order to overcome inherent matrix effects. The procedures encompass the extrapolation back to obtain the sample concentration.
MintMiner	Software used to review large amounts of chromatographic data to monitor for errors or data integrity issues.
Mobile Laboratory	TNI- A portable enclosed structure with necessary and appropriate accommodation and environmental conditions for a laboratory, within which testing is performed by analysts. Examples include but are not limited to trailers, vans, and skid-mounted structures configured to house testing equipment and personnel.
National Institute of Standards and Technology (NIST)	TNI- A federal agency of the US Department of Commerce's Technology Administration that is designed as the United States national metrology institute (or NMI).

National Pollutant Discharge Elimination System (NPDES)	A permit program that controls water pollution by regulating point sources that discharge pollutants into U.S. waters.
Negative Control	DoD- Measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results.
Nitrogen Phosphorus Detector (NPD)	A detector used in GC analyses that utilizes thermal energy to ionize an analyte. With this detector, nitrogen and phosphorus can be selectively detected with a higher sensitivity than carbon.
Nonconformance	DoD- An indication or judgment that a product or service has not met the requirement of the relevant specifications, contract, or regulation; also the state of failing to meet the requirements.
Not Detected (ND)	The result reported for a compound when the detected amount of that compound is less than the method reporting limit.
Percent Recovery	A comparison between the observed value and the true value of a known spiked concentration, represented as a percentage. This evaluation applies to the calculation of ICV, CCV, LCS, MS/MSD, Surrogates, etc.
Performance Audit	DoD- The routine comparison of independently obtained qualitative and quantitative measurement system data with routinely obtained data in order to evaluate the proficiency of an analyst or laboratory.
Performance Based Measurement System (PBMS)	An analytical system wherein the data quality needs, mandates or limitations of a program or project are specified and serve as criteria for selecting appropriate test methods to meet those needs in a cost-effective manner.
Photo-ionization Detector (PID)	An ion detector which uses high-energy photons, typically in the ultraviolet range, to break molecules into positively charged ions.
Polychlorinated Biphenyls (PCB)	A class of organic compounds that were used as coolants and insulating fluids for transformers and capacitors. The production of these compounds was banned in the 1970's due to their high toxicity.
Positive Control	DoD- Measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects.
Post-Digestion Spike	A sample prepared for metals analyses that has analytes spike added to determine if matrix effects may be a factor in the results.
Power of Hydrogen (pH)	The measure of acidity or alkalinity of a solution.
Practical Detection Limit (PDL)	Another term for method detection limit (MDL) or limit of detection (LOD). However, a PDL might not be statically derived and could be set using an in-house protocol.
Practical Quantitation Limit (PQL)	Another term for a method reporting limit or limit of quantitation (LOQ). The lowest reportable concentration of a compound based on parameters set up in an analytical method and the laboratory's ability to reproduce those conditions.
Precision	TNI and DoD- The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms.
Preservation	TNI- Any conditions under which a sample must be kept in order to maintain chemical and/or biological integrity prior to analysis. DoD- Refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical and/or biological integrity of the sample.

Procedure	TNI- A specified way to carry out an activity or process. Procedures can be documented or not.
Proficiency Testing	TNI and DoD- A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source.
Proficiency Testing Program	TNI and DoD- The aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories.
Proficiency Testing Sample (PT)	TNI- A sample, the composition of which is unknown to the laboratory and is provided to test whether the laboratory can produce analytical results within the specified acceptance criteria. DoD- A sample, the composition of which is unknown to the analyst and is provided to test whether the analyst/laboratory can produce analytical results within specified acceptance criteria.
Protocol	TNI and DoD- A detailed written procedure for field and/or laboratory operation (e.g., sampling, analysis) that must be strictly followed.
Quality Assurance (QA)	TNI- An integrated system of management activities involving planning, implementation, assessment, reporting and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the customer. DoD- An integrated system of activities involving planning, quality control, quality assessment, reporting, and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence.
Quality Assurance Manual (QAM)	A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users.
Quality Assurance Project Plan (QAPP)	DoD- A formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved.
Quality Control (QC)	TNI- The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality; also the system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring that the results are of acceptable quality. DoD- The overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of the users.
Quality Control Sample (QCS)	TNI- A sample used to assess the performance of all or a portion of the measurement system. One of any number of samples, such as Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking, intended to demonstrate that a measurement system or activity is in control. DoD- A sample used to assess the performance of all or a portion of the measurement system. One of any number of samples, such as Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking.

Quality Manual	TNI and DoD- A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users.
Quality System	TNI and DoD- A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required quality assurance and quality control activities.
Quality System Matrix	TNI and DoD- These matrix definitions are to be used for purposes of batch and quality control requirements: • **Air and Emissions**: Whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbant tube, impinger solution, filter, or other device • **Aqueous**: Any aqueous sample excluded from the definition of Drinking Water or Saline/Estuarine. Includes surface water, groundwater effluents, and TCLP or other extracts. • **Biological Tissue**: Any sample of a biological origin such as fish tissue, shellfish or plant material. Such samples shall be grouped according to origin. • **Chemical Waste**: A product or by-product of an industrial process that results in a matrix not previously defined. • **Drinking Water**: Any aqueous sample that has been designated a potable or potentially potable water source. • **Non-aqueous liquid**: Any organic liquid with <15% settleable solids • **Saline/Estuarine**: Any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake. • **Solids**: Includes soils, sediments, sludges, and other matrices with >15% settleable solids.
Quantitation Range	DoD- The range of values in a calibration curve between the LOQ and the highest successively analyzed initial calibration standard. The quantitation range lies within the calibration range.
Random Error	The EPA has established that there is a 5% probability that the results obtained for any one analyte will exceed the control limits established for the test due to random error. As the number of compounds measured increases in a given sample, the probability for statistical error also increases.

Raw Data	TNI- The documentation generated during sampling and analysis. This documentation includes, but is not limited to, field notes, electronic data, magnetic tapes, untabulated sample results, QC sample results, print outs of chromatograms, instrument outputs, and handwritten records. DoD- Any original factual information from a measurement activity or study recorded in a laboratory notebook, worksheets, records, memoranda, notes, or exact copies thereof that are necessary for the reconstruction and evaluation of the report of the activity or study. Raw data may include photography, microfilm or microfiche copies, computer printouts, magnetic media, including dictated observations, and recorded data from automated instruments. If exact copies of raw data have been prepared (e.g., tapes which have been transcribed verbatim, data and verified accurate by signature), the exact copy or exact transcript may be submitted.
Reagent Blank (method reagent blank)	DoD- A sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps.
Reagent Grade	Analytical reagent (AR) grade, ACS reagent grade, and reagent grade are synonymous terms for reagents that conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society.
Reference Material	TNI- Material or substance one or more of whose property values are sufficiently homogenized and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. DoD- A material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.
Reference Standard	TNI- Standard used for the calibration of working measurement standards in a given organization or at a given location. DoD- A standard, generally of the highest metrological quality available at a given location, from which measurements made at that location are derived.
Reference Toxicant	DoD- The toxicant used in performing toxicity tests to indicate the sensitivity of a test organism and to demonstrate the laboratory's ability to perform the test correctly and obtain consistent results.
Relative Percent Difference (RPD)	A measure of precision defined as the difference between two measurements divided by the average concentration of the two measurements.
Replicate Sample	The analytical measurement of a sample that has been split after it has been processed through the preparation stage. A replicate can also originate from a single sample that has been sub-sampled two or more times during the same analytical process time.
Reporting Limit (RL)	The level at which method, permit, regulatory and customer-specific objectives are met. The reporting limit may never be lower than the Limit of Detection (i.e. statistically determined MDL). Reporting limits are corrected for sample amounts, including the dry weight of solids, unless otherwise specified. There must be a sufficient buffer between the Reporting Limit and the MDL. DoD- A customer-specified lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

Reporting Limit Verification Standard (or otherwise named)	A standard analyzed at the reporting limit for an analysis to verify the laboratory's ability to report to that level.
Representativeness	A quality element related to the ability to collect a sample reflecting the characteristics of the part of the environment to be assessed. Sample representativeness is dependent on the sampling techniques specified in the project work plan.
Requirement	DoD- Denotes a mandatory specification; often designated by the term "shall".
Response Factor (RF)	A measure of the relative response area of an analyte compared to its internal standard. The response factor is determined by the equation below, and if the calculated value meets the method guidelines it can be used to determine concentration for organic analyses.
Retention Time	DoD- The time between sample injection and the appearance of a solute peak at the detector.
Sample	DoD- Portion of material collected for analysis, identified by a single, unique alphanumeric code. A sample may consist of portions in multiple containers, if a single sample is submitted for multiple or repetitive analysis.
Sample Blank (or Turbidity Blank)	The purpose of a sample blank is to account for spectrophotometric interferences such as sample color, cloudiness, viscosity, etc. The sample blank must be analyzed at the same dilution as the sample. The sample blank is analyzed without any addition of reagents.
Sample Delivery Group (SDG)	A unit within a single project that is used to identify a group of samples for delivery. An SDG is a group of 20 or fewer field samples within a project, received over a period of up to 14 calendar days. Data from all samples in an SDG are reported concurrently.
Sample Detection Limit (SDL)	TX TRRP – The Method Detection Limit (MDL) adjusted to reflect sample-specific actions, such as dilution or use of smaller aliquot sizes than prescribed in the analytical method, and takes into account sample characteristics, sample preparation, and analytical adjustments. The term is analogous to the sample-specific detection limit.
Sample Tracking	Procedures employed to record the possession of the samples from the time of sampling until analysis, reporting and archiving. These procedures include the use of a Chain of custody Form that documents the collection, transport, and receipt of compliance samples to the laboratory. In addition, access to the laboratory is limited and controlled to protect the integrity of the samples.
Sampling	TNI- Activity related to obtaining a representative sample of the object of conformity assessment, according to a procedure.
Secondary Source Calibration Verification (SSCV)	A mid-point or low standard made from the secondary source (lot or manufacturer) that is not used to construct the calibration curve. The SSCV is used to represent the calibration accuracy of the instrument and must perform within method stated guidelines. This sample is used to document calibration accuracy. The SSCV can be the same solution as the LCS, but is analyzed as an instrument standard, rather than a method prepared standard.
Selective Ion Monitoring (SIM)	A mode of analysis in mass spectrometry where the detector is set to scan over a very small mass range, typically one mass unit. The narrower the range, the more sensitive the detector.

Selectivity	TNI- The ability to analyze, distinguish, and determine a specific analyte or parameter from another component that may be a potential interferent or that may behave similarly to the target analyte or parameter within the measurement system. DoD- The capability of a test method or instrument to respond to a target substance or constituent in the presence of non-target substances.
Sensitivity	TNI and DoD- The capability of a method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest.
Serial Dilution	The stepwise dilution of a substance in a solution.
Shall	Denotes a requirement that is mandatory whenever the criterion for conformance with the specification requires that there be no deviation. This does not prohibit the use of alternative approaches or methods for implementing the specification as long as the requirement is fulfilled.
Should	Denotes a guideline or recommendation whenever noncompliance with the specification is permissible.
Signal-to-Noise Ratio	DoD- The signal carries information about the analyte, while noise is made up of extraneous information that is unwanted because it degrades the accuracy and precision of an analysis and also places a lower limit on the amount of analyte that can be detected. In most measurements, the average strength of the noise is constant and independent of the magnitude of the signal. Thus, the effect of noise on the relative error of a measurement becomes greater and greater as the quantity being measured (producing the signal) decreases in magnitude.
Spike	DoD- A known mass of target analyte added to a blank sample or sub-sample; used to determine recovery efficiency or for other quality control purposes.
Standard (Document)	TNI and DoD- The document describing the elements of a laboratory accreditation that has been developed and established within the consensus principles of standard setting and meets the approval requirements of standard adoption organizations procedures and policies.
Standard (Chemical)	DoD- Standard samples are comprised of a known amount of standard reference material in the matrix undergoing analysis. A standard reference material is a certified reference material produced by US NIST and characterized for absolute content, independent of analytical test method.
Standard Blank (or Reagent Blank)	A calibration standard consisting of the same solvent/reagent matrix used to prepare the calibration standards without the analytes. It is used to construct the calibration curve by establishing instrument background.
Standard Method	DoD- A test method issued by an organization generally recognized as competent to do so.
Standard Operating Procedure (SOP)	TNI- A written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps. SOPs are officially approved as the methods for performing certain routine or repetitive tasks. DoD- A written document which details the method of an operation, analysis or action whose techniques and procedures are thoroughly prescribed and which is accepted as the method for performing certain routine or repetitive tasks.
Standard Reference Material (SRM)	DoD- A certified reference material produced by the US NIST or other equivalent organization and characterized for absolute content, independent of analytical method.
Statement of Qualifications (SOQ)	A document that lists information about a company, typically the qualifications of that company to compete on a bid for services.

Stock Standard	A concentrated reference solution containing one or more analytes prepared in the laboratory using an assayed reference compound or purchased from a reputable commercial source.
Supervisor	DoD- The individual(s) designated as being responsible for a particular area or category of scientific analysis. This responsibility includes direct day-to-day supervision of technical employees, supply and instrument adequacy and upkeep, quality assurance/quality control duties and ascertaining that technical employees have the required balance of education, training and experience to perform the required analyses.
Surrogate	DoD- A substance with properties that mimic the analyte of interest. It is unlikely to be found in environmental samples and is added to them for quality control purposes.
SUMMA Canister	A SUMMA canister is a stainless steel electropolished (or "SUMMA" polished) that enriches the nickel and chromium surface and makes it more inert than untreated stainless steel. These canisters are used to collect air or vapor samples.
Systems Audit	An on-site inspection or assessment of a laboratory's quality system.
Target Analytes	DoD- Analytes specifically named by a customer (also called project-specific analytes).
Technical Director	DoD- Individual(s) who has overall responsibility for the technical operation of the environmental testing laboratory.
Technology	TNI- A specific arrangement of analytical instruments, detection systems, and/or preparation techniques.
Tedlar Bags	Bags made from polyvinyl fluoride (PVF) film that are used to collect air or vapor samples.
Tentatively Identified Compound (TIC)	Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates. TICs can be tentatively identified using mass spectrometers in spectral comparisons with NBS library searches. Quantitation of TICs provides a rough approximation of the concentration of these non-target analytes.
Test	DoD- A technical operation that consists of the determination of one or more characteristics or performance of a given product, material, equipment, organism, physical phenomenon, process or service according to a specified procedure. The result of a test is normally recorded in a document sometimes called a test report or a test certificate.
Test Method	DoD- An adoption of a scientific technique for performing a specific measurement as documented in a laboratory SOP or as published by a recognized authority.
Test Methods for Evaluating Solid Waste, Physical/ Chemical (SW-846)	EPA Waste's official compendium of analytical and sampling methods that have been evaluated and approved for use in complying with RCRA regulations.
Total Petroleum Hydrocarbons (TPH)	A term used to denote a large family of several hundred chemical compounds that originate from crude oil. Compounds may include gasoline components, jet fuel, volatile organics, etc.
Toxicity Characteristic Leaching Procedure (TCLP)	A solid sample extraction method for chemical analysis employed as an analytical method to simulate leaching of compounds through a landfill.

Traceability	TNI- The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical conditions or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project. DoD- The property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons.
Training Document	A training resource that provides detailed instructions to execute a specific method or job function.
Trip Blank	This blank sample is used to detect sample contamination from the container and preservative during transport and storage of the sample. A cleaned sample container is filled with laboratory reagent water and the blank is stored, shipped, and analyzed with its associated samples.
Tuning	DoD- A check and/or adjustment of instrument performance for mass spectrometry as required by the method.
Ultraviolet Spectrophotometer (UV)	Instrument routinely used in quantitative determination of solutions of transition metal ions and highly conjugated organic compounds.
Unadjusted Method Quantitation Limit (Unadj. MQL)	TX TRRP – The Method Quantitation Limit (MQL) that has not been adjusted based on sample specific actions such as dilution.
Uncertainty Measurement	The parameter associated with the result of a measurement that characterized the dispersion of the values that could be reasonably attributed to the measurand (i.e. the concentration of an analyte).
Validation	DoD- The confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled.
Verification	TNI and DoD- Confirmation by examination and objective evidence that specified requirements have been met. Note: In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment. The result of verification leads to a decision either to restore in service, to perform adjustment, to repair, to downgrade, or to declare obsolete. In all cases, it is required that a written trace of the verification performed shall be kept on the measuring instrument's individual record.
Whole Effluent Toxicity (WET)	The aggregate toxic effect to aquatic organisms from all pollutants contained in a facility's wastewater (effluent).

Table 3.3b
Analytical Capabilities
AE=Air Emissions, DW=Drinking Water, NPW=Non-potable Water, SCM=Solid Chemical Materials

The information listed is subject to change.
Always check with the laboratory for the most updated information.

Matrix	Method	Parameter
AE	EPA TO-15	Ethanol
AE	EPA TO-15	Gasoline range organic
AE	EPA TO-15	Naphthalene
AE	EPA TO-15	Allyl chloride
AE	EPA TO-15	Chlorotoluene (2-)
AE	EPA TO-15	Isopropylbenzene
AE	EPA TO-15	Methyl methacrylate
AE	EPA TO-15	Tetrahydrofuran
AE	EPA TO-15	Vinyl bromide
AE	EPA TO-15	Dibromoethane (1,2-) (EDB)
AE	EPA TO-15	Dichloroethene (1,1-)
AE	EPA TO-15	Hexachlorobutadiene (1,3-)
AE	EPA TO-15	Hexanone (2-)
AE	EPA TO-15	Acetone
AE	EPA TO-15	Chloromethane
AE	EPA TO-15	Dibromochloromethane
AE	EPA TO-15	Dichlorodifluoromethane
AE	EPA TO-15	Dichloroethene (cis-1,2-)
AE	EPA TO-15	Dichloroethene (trans-1,2-)
AE	EPA TO-15	Dichloropropene (trans-1,3-)
AE	EPA TO-15	Dichlorotetrafluoroethane (1,2-)
AE	EPA TO-15	Ethylbenzene
AE	EPA TO-15	Ethyltoluene (4-)
AE	EPA TO-15	Isopropanol
AE	EPA TO-15	Trichlorofluoromethane
AE	EPA TO-15	Trimethylpentane (2,2,4-)
AE	EPA TO-15	Vinyl chloride
AE	EPA TO-15	Benzene
AE	EPA TO-15	Benzyl chloride
AE	EPA TO-15	Bromodichloromethane
AE	EPA TO-15	Bromoform
AE	EPA TO-15	Bromomethane

Matrix	Method	Parameter
AE	EPA TO-15	Butadiene (1,3-)
AE	EPA TO-15	Carbon disulfide
AE	EPA TO-15	Carbon tetrachloride
AE	EPA TO-15	Chlorobenzene
AE	EPA TO-15	Chloroethane
AE	EPA TO-15	Chloroform
AE	EPA TO-15	Cyclohexane
AE	EPA TO-15	Dichlorobenzene (1,2-)
AE	EPA TO-15	Dichlorobenzene (1,3-)
AE	EPA TO-15	Dichlorobenzene (1,4-)
AE	EPA TO-15	Dichloroethane (1,1-)
AE	EPA TO-15	Dichloroethane (1,2-)
AE	EPA TO-15	Dichloropropane (1,2-)
AE	EPA TO-15	Dichloropropene (cis-1,3-)
AE	EPA TO-15	Dioxane (1,4-)
AE	EPA TO-15	Heptane (n-)
AE	EPA TO-15	Hexane (n-)
AE	EPA TO-15	Methyl ethyl ketone
AE	EPA TO-15	Methyl isobutyl ketone (MIBK)
AE	EPA TO-15	Methyl tert-butyl ether
AE	EPA TO-15	Methylene chloride (Dichloromethane)
AE	EPA TO-15	Styrene
AE	EPA TO-15	Trichlorobenzene (1,2,4-)
AE	EPA TO-15	Trimethylbenzene (1,3,5-)
AE	EPA TO-15	Trimethylbenzene (1,2,4-)
AE	EPA TO-15	Tetrachloroethane (1,1,2,2-)
AE	EPA TO-15	Tetrachloroethene
AE	EPA TO-15	Toluene
AE	EPA TO-15	Trichloroethane (1,1,1-)
AE	EPA TO-15	Trichloroethane (1,1,2-)
AE	EPA TO-15	Trichloroethene
AE	EPA TO-15	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
AE	EPA TO-15	Vinyl acetate
AE	EPA TO-15	Xylene (m-)
AE	EPA TO-15	Xylene (o-)
AE	EPA TO-15	Xylene (p-)
AE	EPA TO-15	Xylenes (total)
AE/NPW	8015M/ RSK-175	Ethane
AE/NPW	8015M/ RSK-175	Ethene
AE/NPW	8015M/ RSK-175	Methane

Matrix	Method	Parameter
AE/NPW	8015M/ RSK-175	Propane
AE/NPW	8015M/ RSK-175	Acetylene
DW	EPA 150.1	pH
DW	EPA 1622	Cryptosporidium
DW	EPA 1623	Cryptosporidium
DW	EPA 1623	Giardia
DW	EPA 180.1	Turbidity
DW	EPA 200.7	Aluminum
DW	EPA 200.7	Antimony
DW	EPA 200.7	Arsenic
DW	EPA 200.7	Barium
DW	EPA 200.7	Beryllium
DW	EPA 200.7	Boron
DW	EPA 200.7	Cadmium
DW	EPA 200.7	Calcium
DW	EPA 200.7	Calcium-hardness
DW	EPA 200.7	Total hardness
DW	EPA 200.7	Chromium
DW	EPA 200.7	Cobalt
DW	EPA 200.7	Copper
DW	EPA 200.7	Iron
DW	EPA 200.7	Lead
DW	EPA 200.7	Magnesium
DW	EPA 200.7	Manganese
DW	EPA 200.7	Molybdenum
DW	EPA 200.7	Nickel
DW	EPA 200.7	Potassium
DW	EPA 200.7	Selenium
DW	EPA 200.7	Silica
DW	EPA 200.7	Silver
DW	EPA 200.7	Sulfur
DW	EPA 200.7	Sodium
DW	EPA 200.7	Strontium
DW	EPA 200.7	Thallium
DW	EPA 200.7	Tin
DW	EPA 200.7	Titanium
DW	EPA 200.7	Vanadium
DW	EPA 200.7	Zinc
DW	EPA 200.8	Aluminum
DW	EPA 200.8	Antimony

Matrix	Method	Parameter
DW	EPA 200.8	Arsenic
DW	EPA 200.8	Barium
DW	EPA 200.8	Beryllium
DW	EPA 200.8	Boron
DW	EPA 200.8	Cadmium
DW	EPA 200.8	Calcium
DW	EPA 200.8	Chromium
DW	EPA 200.8	Cobalt
DW	EPA 200.8	Copper
DW	EPA 200.8	Iron
DW	EPA 200.8	Lead
DW	EPA 200.8	Magnesium
DW	EPA 200.8	Manganese
DW	EPA 200.8	Molybdenum
DW	EPA 200.8	Nickel
DW	EPA 200.8	Potassium
DW	EPA 200.8	Selenium
DW	EPA 200.8	Silver
DW	EPA 200.8	Sodium
DW	EPA 200.8	Strontium
DW	EPA 200.8	Thallium
DW	EPA 200.8	Thorium
DW	EPA 200.8	Tin
DW	EPA 200.8	Titanium
DW	EPA 200.8	Uranium
DW	EPA 200.8	Vanadium
DW	EPA 200.8	Zinc
DW	EPA 218.6	Chromium (VI)
DW	EPA 218.7	Chromium (VI)
DW	EPA 245.1	Mercury
DW	EPA 300.0	Nitrite
DW	EPA 300.0	Nitrate
DW	EPA 300.0	Fluoride
DW	EPA 300.0	Sulfate
DW	EPA 300.0	Bromide
DW	EPA 300.0	Chloride
DW	EPA 314.0	Perchlorate
DW	EPA 335.4	Cyanide
DW	EPA 350.1	Ammonia
DW	EPA 353.2	Nitrate

Matrix	Method	Parameter
DW	EPA 353.2	Nitrite
DW	EPA 504.1	Dibromoethane (1,2-) (EDB)
DW	EPA 504.1	Dibromo-3-chloropropane (1,2-)
DW	EPA 507	Alachlor
DW	EPA 507	Butachlor
DW	EPA 507	Metolachlor
DW	EPA 507	Metribuzin
DW	EPA 507	Atrazine
DW	EPA 507	Simazine
DW	EPA 524.2	Tetrahydrofuran
DW	EPA 524.2	Dichloro-2-butene (trans-1,4-)
DW	EPA 524.2	Hexachloroethane
DW	EPA 524.2	Acetone
DW	EPA 524.2	Butanone (2-)
DW	EPA 524.2	Carbon disulfide
DW	EPA 524.2	Hexanone (2-)
DW	EPA 524.2	Pentanone (4-methyl-2-) (MIBK)
DW	EPA 524.2	Trichlorobenzene (1,3,5-)
DW	EPA 524.2	Bromochloromethane
DW	EPA 524.2	Bromoform
DW	EPA 524.2	Chloroform
DW	EPA 524.2	Dibromochloromethane
DW	EPA 524.2	Bromodichloromethane
DW	EPA 524.2	Benzene
DW	EPA 524.2	Carbon tetrachloride
DW	EPA 524.2	Chlorobenzene
DW	EPA 524.2	Dichlorobenzene (1,2-)
DW	EPA 524.2	Dichlorobenzene (1,3-)
DW	EPA 524.2	Dichlorobenzene (1,4-)
DW	EPA 524.2	Dichloroethane (1,1-)
DW	EPA 524.2	Dichloroethane (1,2-)
DW	EPA 524.2	Dichloroethene (cis-1,2-)
DW	EPA 524.2	Dichloroethene (trans-1,2-)
DW	EPA 524.2	Methylene chloride (Dichloromethane)
DW	EPA 524.2	Dichloropropane (1,2-)
DW	EPA 524.2	Ethylbenzene
DW	EPA 524.2	Methyl tert-butyl ether
DW	EPA 524.2	Naphthalene
DW	EPA 524.2	Styrene
DW	EPA 524.2	Tetrachloroethane (1,1,2,2-)

Matrix	Method	Parameter
DW	EPA 524.2	Tetrachloroethene
DW	EPA 524.2	Trichloroethane (1,1,1-)
DW	EPA 524.2	Trichloroethene
DW	EPA 524.2	Toluene
DW	EPA 524.2	Trichlorobenzene (1,2,4-)
DW	EPA 524.2	Dichloroethene (1,1-)
DW	EPA 524.2	Trichloroethane (1,1,2-)
DW	EPA 524.2	Vinyl chloride
DW	EPA 524.2	Xylenes (total)
DW	EPA 524.2	Bromobenzene
DW	EPA 524.2	Bromomethane
DW	EPA 524.2	Butyl benzene (n-)
DW	EPA 524.2	Sec-butylbenzene
DW	EPA 524.2	Tert-butylbenzene
DW	EPA 524.2	Chloroethane
DW	EPA 524.2	Chloromethane
DW	EPA 524.2	Chlorotoluene (2-)
DW	EPA 524.2	Chlorotoluene (4-)
DW	EPA 524.2	Dibromo-3-chloropropane (1,2-)
DW	EPA 524.2	Dibromoethane (1,2-) (EDB)
DW	EPA 524.2	Dibromomethane
DW	EPA 524.2	Dichlorodifluoromethane
DW	EPA 524.2	Dichloropropane (1,3-)
DW	EPA 524.2	Dichloropropane (2,2-)
DW	EPA 524.2	Dichloropropene (1,1-)
DW	EPA 524.2	Dichloropropene (cis-1,3-)
DW	EPA 524.2	Dichloropropene (trans-1,3-)
DW	EPA 524.2	Hexachlorobutadiene (1,3-)
DW	EPA 524.2	Isopropylbenzene
DW	EPA 524.2	Isopropyltoluene (4-)
DW	EPA 524.2	Propylbenzene (n-)
DW	EPA 524.2	Tetrachloroethane (1,1,1,2-)
DW	EPA 524.2	Trichlorobenzene (1,2,3-)
DW	EPA 524.2	Trichlorofluoromethane
DW	EPA 524.2	Trichloropropane (1,2,3-)
DW	EPA 524.2	Trimethylbenzene (1,2,4-)
DW	EPA 524.2	Trimethylbenzene (1,3,5-)
DW	EPA 552.2	Bromochloroacetic acid
DW	EPA 552.2	Dibromoacetic acid
DW	EPA 552.2	Dichloroacetic acid

Matrix	Method	Parameter
DW	EPA 552.2	Monobromoacetic acid (MBAA)
DW	EPA 552.2	Monochloroacetic acid (MCAA)
DW	EPA 552.2	Trichloroacetic acid
DW	SM 2120 B	Color
DW	SM 2130 B	Turbidity
DW	SM 2150 B	Odor
DW	SM 2320 B	Alkalinity
DW	SM 2340 B	Total hardness
DW	SM 2340 C	Total hardness
DW	SM 2510 B	Conductivity
DW	SM 2540 C	Total dissolved solids (TDS)
DW	SM 3120 B	Total hardness
DW	SM 4110 B	Bromide
DW	SM 4110 B	Nitrite
DW	SM 4110 B	Nitrate
DW	SM 4110 B	Fluoride
DW	SM 4110 B	Sulfate
DW	SM 4110 B	Chloride
DW	SM 4500-Cl G	Chlorine - residual
DW	SM 4500-CN C,E	Cyanide
DW	SM 4500-CN C,G	Cyanide
DW	SM 4500-H B	pH
DW	SM 4500-NH3 G	Ammonia
DW	SM 4500-NO3 F	Nitrate
DW	SM 4500-NO3 F	Nitrite
DW	SM 4500-P E	Orthophosphate
DW	SM 5310 B	Total organic carbon (TOC)
DW	SM 5310 C	Dissolved organic carbon (DOC)
DW	SM 5310 C	Total organic carbon (TOC)
DW	SM 5320 B	Total organic halides (TOX)
DW	SM 5540 C	Foaming agents
DW	SM 5910 B	UV-absorbing compounds
DW	SM 9215B (Pour Plate)	Heterotropic Bacteria
DW	SM 9223 B (Colilert)	Total coliform / E. coli
DW	User Defined 524.2	Diisopropyl Ether [DIPE]
NPW	ASTM D6503	Enterococci
NPW	ASTM F1647-02A	Total organic carbon (TOC)
NPW	EPA 1000.0	Toxicity - chronic, FW organism
NPW	EPA 1002.0	Toxicity - chronic, FW organism

Matrix	Method	Parameter
NPW	EPA 120.1	Specific conductance
NPW	EPA 130.1	Hardness - total as CaCO3
NPW	EPA 160.4	Residue - volatile
NPW	EPA 1657	Phorate
NPW	EPA 1657	Bolstar
NPW	EPA 1657	Chlorpyrifos
NPW	EPA 1657	Coumaphos
NPW	EPA 1657	Dichlorvos
NPW	EPA 1657	Dimethoate
NPW	EPA 1657	EPN
NPW	EPA 1657	Fensulfothion
NPW	EPA 1657	Fenthion
NPW	EPA 1657	Naled
NPW	EPA 1657	Parathion ethyl
NPW	EPA 1657	Parathion methyl
NPW	EPA 1657	Ronnel
NPW	EPA 1657	Stirofos
NPW	EPA 1657	Sulfotepp
NPW	EPA 1657	TEPP
NPW	EPA 1657	Tokuthion [Protothiofos]
NPW	EPA 1657	Trichloronate
NPW	EPA 1658	D (2,4-)
NPW	EPA 1658	Dalapon
NPW	EPA 1658	Dichlorprop
NPW	EPA 1664A & B	Oil & grease - hem-SPE
NPW	EPA 1664A & B	Oil & grease - non polar
NPW	EPA 1664A & B	Oil & grease - hem-LL
NPW	EPA 1664A & B	Oil & grease - sgt-non polar-SPE
NPW	EPA 180.1	Turbidity
NPW	EPA 200.7	Aluminum
NPW	EPA 200.7	Antimony
NPW	EPA 200.7	Arsenic
NPW	EPA 200.7	Barium
NPW	EPA 200.7	Beryllium
NPW	EPA 200.7	Boron
NPW	EPA 200.7	Cadmium
NPW	EPA 200.7	Calcium
NPW	EPA 200.7	Calcium-hardness
NPW	EPA 200.7	Total hardness
NPW	EPA 200.7	Chromium

Matrix	Method	Parameter
NPW	EPA 200.7	Cobalt
NPW	EPA 200.7	Copper
NPW	EPA 200.7	Iron
NPW	EPA 200.7	Lead
NPW	EPA 200.7	Lithium
NPW	EPA 200.7	Magnesium
NPW	EPA 200.7	Manganese
NPW	EPA 200.7	Molybdenum
NPW	EPA 200.7	Nickel
NPW	EPA 200.7	Potassium
NPW	EPA 200.7	Selenium
NPW	EPA 200.7	Silica
NPW	EPA 200.7	Silver
NPW	EPA 200.7	Sulfur
NPW	EPA 200.7	Sodium
NPW	EPA 200.7	Strontium
NPW	EPA 200.7	Thallium
NPW	EPA 200.7	Tin
NPW	EPA 200.7	Titanium
NPW	EPA 200.7	Vanadium
NPW	EPA 200.7	Zinc
NPW	EPA 200.8	Aluminum
NPW	EPA 200.8	Antimony
NPW	EPA 200.8	Arsenic
NPW	EPA 200.8	Barium
NPW	EPA 200.8	Beryllium
NPW	EPA 200.8	Boron
NPW	EPA 200.8	Cadmium
NPW	EPA 200.8	Calcium
NPW	EPA 200.8	Chromium
NPW	EPA 200.8	Cobalt
NPW	EPA 200.8	Copper
NPW	EPA 200.8	Iron
NPW	EPA 200.8	Lead
NPW	EPA 200.8	Magnesium
NPW	EPA 200.8	Manganese
NPW	EPA 200.8	Molybdenum
NPW	EPA 200.8	Nickel
NPW	EPA 200.8	Potassium
NPW	EPA 200.8	Selenium

Matrix	Method	Parameter
NPW	EPA 200.8	Silver
NPW	EPA 200.8	Sodium
NPW	EPA 200.8	Strontium
NPW	EPA 200.8	Thallium
NPW	EPA 200.8	Thorium
NPW	EPA 200.8	Tin
NPW	EPA 200.8	Titanium
NPW	EPA 200.8	Uranium
NPW	EPA 200.8	Vanadium
NPW	EPA 200.8	Zinc
NPW	EPA 2000.0	Toxicity - acute, FW organism
NPW	EPA 2002.0	Toxicity - acute, FW organism
NPW	EPA 218.6	Chromium (VI)
NPW	EPA 245.1	Mercury
NPW	EPA 300.0	Guanidine nitrate
NPW	EPA 300.0	Bromide
NPW	EPA 300.0	Chloride
NPW	EPA 300.0	Fluoride
NPW	EPA 300.0	Nitrate
NPW	EPA 300.0	Nitrite
NPW	EPA 300.0	Sulfate
NPW	EPA 300.0	Nitrate - nitrite
NPW	EPA 310.2	Alkalinity as CaCO3
NPW	EPA 314.0	Perchlorate
NPW	EPA 335.4	Cyanide
NPW	EPA 350.1	Ammonia
NPW	EPA 351.1, .2 - 350.1	Organic nitrogen
NPW	EPA 351.2	Kjeldahl nitrogen - total
NPW	EPA 353.2	Nitrate - nitrite
NPW	EPA 365.1	Total Phosphorus
NPW	EPA 365.4	Total Phosphorus
NPW	EPA 410.4	Chemical oxygen demand
NPW	EPA 420.4	Phenols
NPW	EPA 507	Alachlor
NPW	EPA 507	Metribuzin
NPW	EPA 507	Ethoprop
NPW	EPA 507	Merphos
NPW	EPA 507	Mevinphos
NPW	EPA 602	Benzene
NPW	EPA 602	Ethylbenzene

Matrix	Method	Parameter
NPW	EPA 602	Methyl tert-butyl ether
NPW	EPA 602	Tert-butyl alcohol
NPW	EPA 602	Toluene
NPW	EPA 602	Xylenes (total)
NPW	EPA 608	Chloroneb
NPW	EPA 608	Chlorothalonil
NPW	EPA 608	Chlordane (alpha)
NPW	EPA 608	Chlordane (gamma)
NPW	EPA 608	Hexachlorobenzene
NPW	EPA 608	PCB 1016
NPW	EPA 608	PCB 1221
NPW	EPA 608	PCB 1232
NPW	EPA 608	PCB 1242
NPW	EPA 608	PCB 1248
NPW	EPA 608	PCB 1254
NPW	EPA 608	PCB 1260
NPW	EPA 608	Aldrin
NPW	EPA 608	Alpha BHC
NPW	EPA 608	Beta BHC
NPW	EPA 608	Delta BHC
NPW	EPA 608	Lindane (gamma BHC)
NPW	EPA 608	Chlordane
NPW	EPA 608	DDD (4,4'-)
NPW	EPA 608	DDE (4,4'-)
NPW	EPA 608	DDT (4,4'-)
NPW	EPA 608	Dieldrin
NPW	EPA 608	Endosulfan I
NPW	EPA 608	Endosulfan II
NPW	EPA 608	Endosulfan sulfate
NPW	EPA 608	Endrin
NPW	EPA 608	Endrin aldehyde
NPW	EPA 608	Endrin ketone
NPW	EPA 608	Heptachlor
NPW	EPA 608	Heptachlor epoxide
NPW	EPA 608	Methoxychlor
NPW	EPA 608	Toxaphene
NPW	EPA 610	Acenaphthene
NPW	EPA 610	Acenaphthylene
NPW	EPA 610	Anthracene
NPW	EPA 610	Benzo(a)anthracene

Matrix	Method	Parameter
NPW	EPA 610	Benzo(a)pyrene
NPW	EPA 610	Benzo(b)fluoranthene
NPW	EPA 610	Benzo(ghi)perylene
NPW	EPA 610	Benzo(k)fluoranthene
NPW	EPA 610	Chrysene
NPW	EPA 610	Dibenzo(a,h)anthracene
NPW	EPA 610	Fluoranthene
NPW	EPA 610	Fluorene
NPW	EPA 610	Indeno(1,2,3-cd)pyrene
NPW	EPA 610	Naphthalene
NPW	EPA 610	Phenanthrene
NPW	EPA 610	Pyrene
NPW	EPA 615	Dicamba
NPW	EPA 615	DB (2,4-)
NPW	EPA 615	Dinoseb
NPW	EPA 615	Dalapon
NPW	EPA 615	Dichlorprop
NPW	EPA 615	D (2,4-)
NPW	EPA 615	T (2,4,5-)
NPW	EPA 615	TP (2,4,5-) (Silvex)
NPW	EPA 615	MCPA
NPW	EPA 615	MCPP
NPW	EPA 622	Coumaphos
NPW	EPA 622	Demeton (o-)
NPW	EPA 622	Demeton (s-)
NPW	EPA 622	Dimethoate
NPW	EPA 622	Parathion ethyl
NPW	EPA 622	Parathion methyl
NPW	EPA 622	Stirofos
NPW	EPA 622	Sulfotepp
NPW	EPA 622	TEPP
NPW	EPA 622	Tokuthion [Protothiofos]
NPW	EPA 622	Trichloronate
NPW	EPA 624	Amyl alcohol (n-)
NPW	EPA 624	Propionitrile
NPW	EPA 624	Trimethylbenzene (1,2,3-)
NPW	EPA 624	Allyl chloride
NPW	EPA 624	Bromoethane
NPW	EPA 624	Butanone (2-)
NPW	EPA 624	Butadiene (2-chloro-1,3-)

Matrix	Method	Parameter
NPW	EPA 624	Carbon disulfide
NPW	EPA 624	Cyclohexanone
NPW	EPA 624	Dichloro-2-butene (cis-1,4-)
NPW	EPA 624	Dichloro-2-butene (trans-1,4-)
NPW	EPA 624	Diethyl ether (Ethyl ether)
NPW	EPA 624	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
NPW	EPA 624	Vinyl acetate
NPW	EPA 624	Acetonitrile
NPW	EPA 624	Cyclohexane
NPW	EPA 624	Hexanone (2-)
NPW	EPA 624	Methylcyclohexane
NPW	EPA 624	Methyl iodide
NPW	EPA 624	Ethyl-tert-butyl Ether [ETBE]
NPW	EPA 624	Diisopropyl Ether [DIPE]
NPW	EPA 624	Dioxane (1,4-)
NPW	EPA 624	Butanol (1-)
NPW	EPA 624	Ethanol
NPW	EPA 624	Ethyl methacrylate
NPW	EPA 624	Iso-butyl alcohol
NPW	EPA 624	Methacrylonitrile
NPW	EPA 624	Methyl methacrylate
NPW	EPA 624	Octane (-n)
NPW	EPA 624	Pentachloroethane
NPW	EPA 624	tert-Amylmethyl ether [TAME]
NPW	EPA 624	Acrolein
NPW	EPA 624	Acrylonitrile
NPW	EPA 624	Bromobenzene
NPW	EPA 624	Bromochloromethane
NPW	EPA 624	Butyl benzene (n-)
NPW	EPA 624	Chlorotoluene (2-)
NPW	EPA 624	Chlorotoluene (4-)
NPW	EPA 624	Dibromo-3-chloropropane (1,2-)
NPW	EPA 624	Dibromoethane (1,2-) (EDB)
NPW	EPA 624	Dibromomethane
NPW	EPA 624	Dichlorodifluoromethane
NPW	EPA 624	Dichloroethene (cis-1,2-)
NPW	EPA 624	Dichloropropane (1,3-)
NPW	EPA 624	Dichloropropane (2,2-)
NPW	EPA 624	Dichloropropene (1,1-)
NPW	EPA 624	Hexane (n-)

Matrix	Method	Parameter
NPW	EPA 624	Methyl isobutyl ketone (MIBK)
NPW	EPA 624	Tetrahydrofuran
NPW	EPA 624	Styrene
NPW	EPA 624	Tetrachloroethane (1,1,1,2-)
NPW	EPA 624	Xylene (m-)
NPW	EPA 624	Xylene (o-)
NPW	EPA 624	Xylene (p-)
NPW	EPA 624	Hexachlorobutadiene (1,3-)
NPW	EPA 624	Isopropylbenzene
NPW	EPA 624	Isopropyltoluene (4-)
NPW	EPA 624	Naphthalene
NPW	EPA 624	Propylbenzene (n-)
NPW	EPA 624	Sec-butylbenzene
NPW	EPA 624	Tert-butylbenzene
NPW	EPA 624	Trichlorobenzene (1,2,3-)
NPW	EPA 624	Trichlorobenzene (1,2,4-)
NPW	EPA 624	Trichloropropane (1,2,3-)
NPW	EPA 624	Trimethylbenzene (1,2,4-)
NPW	EPA 624	Trimethylbenzene (1,3,5-)
NPW	EPA 624	Acetone
NPW	EPA 624	Ethyl acetate
NPW	EPA 624	Methyl tert-butyl ether
NPW	EPA 624	Tert-butyl alcohol
NPW	EPA 624	Xylenes (total)
NPW	EPA 624	Benzene
NPW	EPA 624	Bromodichloromethane
NPW	EPA 624	Bromoform
NPW	EPA 624	Bromomethane
NPW	EPA 624	Carbon tetrachloride
NPW	EPA 624	Chlorobenzene
NPW	EPA 624	Chloroethane
NPW	EPA 624	Chloroethyl vinyl ether (2-)
NPW	EPA 624	Chloroform
NPW	EPA 624	Chloromethane
NPW	EPA 624	Dibromochloromethane
NPW	EPA 624	Dichlorobenzene (1,2-)
NPW	EPA 624	Dichlorobenzene (1,3-)
NPW	EPA 624	Dichlorobenzene (1,4-)
NPW	EPA 624	Dichloroethane (1,1-)
NPW	EPA 624	Dichloroethane (1,2-)

Matrix	Method	Parameter
NPW	EPA 624	Dichloroethene (1,1-)
NPW	EPA 624	Dichloroethene (trans-1,2-)
NPW	EPA 624	Dichloropropane (1,2-)
NPW	EPA 624	Dichloropropene (cis-1,3-)
NPW	EPA 624	Dichloropropene (trans-1,3-)
NPW	EPA 624	Ethylbenzene
NPW	EPA 624	Methylene chloride (Dichloromethane)
NPW	EPA 624	Tetrachloroethane (1,1,2,2-)
NPW	EPA 624	Tetrachloroethene
NPW	EPA 624	Toluene
NPW	EPA 624	Trichloroethane (1,1,1-)
NPW	EPA 624	Trichloroethane (1,1,2-)
NPW	EPA 624	Trichloroethene
NPW	EPA 624	Trichlorofluoromethane
NPW	EPA 624	Vinyl chloride
NPW	EPA 625	Tetrachlorophenol (2,3,4,6-)
NPW	EPA 625	Hexachlorophene
NPW	EPA 625	Decane (n-)
NPW	EPA 625	Octadecane (n-)
NPW	EPA 625	Chloronaphthalene (1-)
NPW	EPA 625	Famphur
NPW	EPA 625	Hexachloropropene
NPW	EPA 625	Kepone
NPW	EPA 625	Napththylamine (1-)
NPW	EPA 625	Napththylamine (2-)
NPW	EPA 625	Pentachloroethane
NPW	EPA 625	Methylnaphthalene (2-)
NPW	EPA 625	Chloroaniline (4-)
NPW	EPA 625	Nitroaniline (2-)
NPW	EPA 625	Nitroaniline (3-)
NPW	EPA 625	Nitroaniline (4-)
NPW	EPA 625	Pentachlorobenzene
NPW	EPA 625	Tetrachlorobenzene (1,2,4,5-)
NPW	EPA 625	Methylphenol (4-)
NPW	EPA 625	Acetophenone
NPW	EPA 625	Aniline
NPW	EPA 625	Dichloroaniline (2,3-)
NPW	EPA 625	Diphenylhydrazine (1,2-)
NPW	EPA 625	Methylphenol (2-)
NPW	EPA 625	N-Nitroso-di-n-butylamine

Matrix	Method	Parameter
NPW	EPA 625	N-Nitrosodiethylamine
NPW	EPA 625	N-Nitrosopyrrolidine
NPW	EPA 625	Hexachlorocyclopentadiene
NPW	EPA 625	N-Nitrosodimethylamine
NPW	EPA 625	N-Nitrosodiphenylamine
NPW	EPA 625	Dibenzofuran
NPW	EPA 625	Methylphenol (2-)
NPW	EPA 625	Methylphenol (4-)
NPW	EPA 625	Trichlorophenol (2,4,5-)
NPW	EPA 625	Benzoic acid
NPW	EPA 625	Benzidine
NPW	EPA 625	Carbazole
NPW	EPA 625	Pyridine
NPW	EPA 625	Acenaphthene
NPW	EPA 625	Acenaphthylene
NPW	EPA 625	Anthracene
NPW	EPA 625	Benzo(a)anthracene
NPW	EPA 625	Benzo(b)fluoranthene
NPW	EPA 625	Benzo(k)fluoranthene
NPW	EPA 625	Benzo(a)pyrene
NPW	EPA 625	Benzo(g,h,i)perylene
NPW	EPA 625	Butyl benzyl phthalate
NPW	EPA 625	Bis (2-chloroethyl) ether
NPW	EPA 625	Bis (2-chloroethoxy) methane
NPW	EPA 625	Bis (2-ethylhexyl) phthalate
NPW	EPA 625	Bis (2-chloroisopropyl) ether
NPW	EPA 625	Bromophenyl-phenyl ether (4-)
NPW	EPA 625	Chloronaphthalene (2-)
NPW	EPA 625	Chlorophenyl-phenyl ether (4-)
NPW	EPA 625	Chrysene
NPW	EPA 625	Dibenzo(a,h)anthracene
NPW	EPA 625	Di-n-butyl phthalate
NPW	EPA 625	Dichlorobenzidine (3,3'-)
NPW	EPA 625	Diethyl phthalate
NPW	EPA 625	Dimethyl phthalate
NPW	EPA 625	Dinitrotoluene (2,4-)
NPW	EPA 625	Dinitrotoluene (2,6-)
NPW	EPA 625	Di-n-octyl phthalate
NPW	EPA 625	Fluoranthene
NPW	EPA 625	Fluorene

Matrix	Method	Parameter
NPW	EPA 625	Hexachlorobenzene
NPW	EPA 625	Hexachlorobutadiene (1,3-)
NPW	EPA 625	Hexachloroethane
NPW	EPA 625	Indeno(1,2,3-c,d)pyrene
NPW	EPA 625	Isophorone
NPW	EPA 625	Naphthalene
NPW	EPA 625	Nitrobenzene
NPW	EPA 625	N-Nitroso-di-n-propylamine
NPW	EPA 625	Phenanthrene
NPW	EPA 625	Pyrene
NPW	EPA 625	Trichlorobenzene (1,2,4-)
NPW	EPA 625	Methyl phenol (4-chloro-3-)
NPW	EPA 625	Chlorophenol (2-)
NPW	EPA 625	Dichlorophenol (2,4-)
NPW	EPA 625	Dimethylphenol (2,4-)
NPW	EPA 625	Dinitrophenol (2,4-)
NPW	EPA 625	Dinitrophenol (2-methyl-4,6-)
NPW	EPA 625	Nitrophenol (2-)
NPW	EPA 625	Nitrophenol (4-)
NPW	EPA 625	Pentachlorophenol
NPW	EPA 625	Phenol
NPW	EPA 625	Trichlorophenol (2,4,6-)
NPW	Other FL - PRO	Petroleum Organics
NPW	Other IA - OA-1	Petroleum Organics
NPW	Other IA - OA-2	Petroleum Organics
NPW	Other NJ-OQA-QAM-025	Petroleum Organics
NPW	Other NJ-OQA-QAM-025, Rev. 7	Petroleum Organics
NPW	Other NJ-OQA-QAM-025, Rev. 7	Petroleum Organics
NPW	Other NJ DEP EPH 10/08, Rev 3	Petroleum Organics
NPW	Other USDA-LOI (Loss on ignition)	Total organic carbon (TOC)
NPW	Other Walkley Black	Total organic carbon (TOC)
NPW	SM 2120 B-11	Color
NPW	SM 2130 B-11	Turbidity
NPW	SM 2310 B-11	Acidity as CaCO3
NPW	SM 2320 B-11	Alkalinity as CaCO3
NPW	SM 2340 B-11	Hardness - total as CaCO3
NPW	SM 2340 C-11	Hardness - total as CaCO3

Matrix	Method	Parameter
NPW	SM 2510 B-11	Specific conductance
NPW	SM 2540 B-11	Residue - total
NPW	SM 2520 B-11	Salinity
NPW	SM 2540 C-11	Residue - filterable (TDS)
NPW	SM 2540 D-11	Residue - nonfilterable (TSS)
NPW	SM 2540 F-11	Residue - settleable
NPW	SM 2540 G SM 18th Ed.	Total, fixed, and volatile solids (SQAR)
NPW	SM 2550 B-00	Temperature
NPW	SM 3500-Cr B-11	Chromium (VI)
NPW	SM 3500-Cr C-11	Chromium (VI)
NPW	SM 3500-Fe B-11	Iron, Ferrous
NPW	SM 4110 B or C-11	Nitrate - nitrite
NPW	SM 4110 B or C-11	Chloride
NPW	SM 4110 B or C-11	Fluoride
NPW	SM 4110 B or C-11	Nitrate
NPW	SM 4110 B or C-11	Nitrite
NPW	SM 4110 B or C-11	Sulfate
NPW	SM 4500-Cl G-11	Chlorine
NPW	SM 4500-Cl G-11	Chlorine
NPW	SM 4500-CN B or C-11 plus E-11	Cyanide
NPW	SM 4500-CN B or C-11 and G-11	Cyanide - amenable to Cl2
NPW	SM 4500-H B-11	pH
NPW	SM 4500-N Org B or C-11 plus NH3 B-11 plus NH3 C-11	Kjeldahl nitrogen - total
NPW	SM 4500-NH3 B plus G-11	Ammonia
NPW	SM 4500-NH3 B, C, D, E, F, G, H-11	Organic nitrogen
NPW	SM 4500-NO3 F-11	Nitrate - nitrite
NPW	SM 4500-O C-11	Oxygen (dissolved)
NPW	SM 4500-O G-11	Oxygen (dissolved)
NPW	SM 4500-P B5-11 plus E-11	Phosphorus (total)
NPW	SM 4500-P E-11	Orthophosphate
NPW	SM 4500-S B, C plus D-11	Sulfides
NPW	SM 4500-SO3 B-11	Sulfite - SO3
NPW	SM 5210 B-11	Carbonaceous BOD (CBOD)
NPW	SM 5210 B-11	Biochemical oxygen demand

Matrix	Method	Parameter
NPW	SM 5220 D-11	Chemical oxygen demand
NPW	SM 5310 B, C or D-11	Dissolved organic carbon (DOC)
NPW	SM 5310 B-11	Total organic carbon (TOC)
NPW	SM 5320 B-11	Total organic halides (TOX)
NPW	SM 5520 B-11	Oil & grease - total recov
NPW	SM 5520 B-11	Oil & grease - hem-LL
NPW	SM 5540 C-11	Surfactants
NPW	SM 6200 B-97	Propionitrile
NPW	SM 6200 B-97	Trimethylbenzene (1,2,3-)
NPW	SM 6200 B-97	Allyl chloride
NPW	SM 6200 B-97	Bromoethane
NPW	SM 6200 B-97	Butadiene (2-chloro-1,3-)
NPW	SM 6200 B-97	Cyclohexanone
NPW	SM 6200 B-97	Dichloro-2-butene (cis-1,4-)
NPW	SM 6200 B-97	Dichloro-2-butene (trans-1,4-)
NPW	SM 6200 B-97	Diethyl ether (Ethyl ether)
NPW	SM 6200 B-97	Isopropanol
NPW	SM 6200 B-97	Ethyl-tert-butyl Ether [ETBE]
NPW	SM 6200 B-97	Diisopropyl Ether [DIPE]
NPW	SM 6200 B-97	Dioxane (1,4-)
NPW	SM 6200 B-97	Ethanol
NPW	SM 6200 B-97	Ethyl methacrylate
NPW	SM 6200 B-97	Iso-butyl alcohol
NPW	SM 6200 B-97	Methacrylonitrile
NPW	SM 6200 B-97	Methyl methacrylate
NPW	SM 6200 B-97	Pentachloroethane
NPW	SM 6200 B-97	tert-Amylmethyl ether [TAME]
NPW	SM 6200 B-97	Acrolein
NPW	SM 6200 B-97	Acrylonitrile
NPW	SM 6200 B-97	Bromobenzene
NPW	SM 6200 B-97	Bromochloromethane
NPW	SM 6200 B-97	Butyl benzene (n-)
NPW	SM 6200 B-97	Chlorotoluene (2-)
NPW	SM 6200 B-97	Chlorotoluene (4-)
NPW	SM 6200 B-97	Dibromo-3-chloropropane (1,2-)
NPW	SM 6200 B-97	Dibromomethane
NPW	SM 6200 B-97	Dichlorodifluoromethane
NPW	SM 6200 B-97	Dichloropropane (1,3-)
NPW	SM 6200 B-97	Dichloropropane (2,2-)
NPW	SM 6200 B-97	Dichloropropene (1,1-)

Matrix	Method	Parameter
NPW	SM 6200 B-97	Hexane (n-)
NPW	SM 6200 B-97	Methyl isobutyl ketone (MIBK)
NPW	SM 6200 B-97	Tetrahydrofuran
NPW	SM 6200 B-97	Tetrachloroethane (1,1,1,2-)
NPW	SM 6200 B-97	Xylene (m-)
NPW	SM 6200 B-97	Xylene (p-)
NPW	SM 6200 B-97	Hexachlorobutadiene (1,3-)
NPW	SM 6200 B-97	Isopropylbenzene
NPW	SM 6200 B-97	Isopropyltoluene (4-)
NPW	SM 6200 B-97	Propylbenzene (n-)
NPW	SM 6200 B-97	Sec-butylbenzene
NPW	SM 6200 B-97	Tert-butylbenzene
NPW	SM 6200 B-97	Trichlorobenzene (1,2,3-)
NPW	SM 6200 B-97	Trichloropropane (1,2,3-)
NPW	SM 6200 B-97	Trimethylbenzene (1,2,4-)
NPW	SM 6200 B-97	Trimethylbenzene (1,3,5-)
NPW	SM 6200 B-97	Acetone
NPW	SM 6200 B-97	Ethyl acetate
NPW	SM 6200 B-97	Methyl tert-butyl ether
NPW	SM 6200 B-97	Tert-butyl alcohol
NPW	SM 6200 B-97	Benzene
NPW	SM 6200 B-97	Bromodichloromethane
NPW	SM 6200 B-97	Bromoform
NPW	SM 6200 B-97	Bromomethane
NPW	SM 6200 B-97	Carbon tetrachloride
NPW	SM 6200 B-97	Chlorobenzene
NPW	SM 6200 B-97	Chloroethane
NPW	SM 6200 B-97	Chloroform
NPW	SM 6200 B-97	Chloromethane
NPW	SM 6200 B-97	Dibromochloromethane
NPW	SM 6200 B-97	Dichlorobenzene (1,2-)
NPW	SM 6200 B-97	Dichlorobenzene (1,3-)
NPW	SM 6200 B-97	Dichlorobenzene (1,4-)
NPW	SM 6200 B-97	Dichloroethane (1,1-)
NPW	SM 6200 B-97	Dichloroethane (1,2-)
NPW	SM 6200 B-97	Dichloroethene (1,1-)
NPW	SM 6200 B-97	Dichloroethene (trans-1,2-)
NPW	SM 6200 B-97	Dichloropropane (1,2-)
NPW	SM 6200 B-97	Dichloropropene (cis-1,3-)
NPW	SM 6200 B-97	Dichloropropene (trans-1,3-)

Matrix	Method	Parameter
NPW	SM 6200 B-97	Ethylbenzene
NPW	SM 6200 B-97	Methylene chloride (Dichloromethane)
NPW	SM 6200 B-97	Tetrachloroethane (1,1,2,2-)
NPW	SM 6200 B-97	Tetrachloroethene
NPW	SM 6200 B-97	Toluene
NPW	SM 6200 B-97	Trichloroethane (1,1,1-)
NPW	SM 6200 B-97	Trichloroethane (1,1,2-)
NPW	SM 6200 B-97	Trichloroethene
NPW	SM 6200 B-97	Trichlorofluoromethane
NPW	SM 6200 B-97	Vinyl chloride
NPW	SM 6200 B-97	Naphthalene
NPW	SM 6200 B-97	Trichlorobenzene (1,2,4-)
NPW	SM 6410 B-00	Tetrachlorophenol (2,3,4,6-)
NPW	SM 6410 B-00	Hexachlorophene
NPW	SM 6410 B-00	Decane (n-)
NPW	SM 6410 B-00	Octadecane (n-)
NPW	SM 6410 B-00	Biphenylamine (4-)
NPW	SM 6410 B-00	Chloronaphthalene (1-)
NPW	SM 6410 B-00	Famphur
NPW	SM 6410 B-00	Hexachloropropene
NPW	SM 6410 B-00	Kepone
NPW	SM 6410 B-00	Napththylamine (1-)
NPW	SM 6410 B-00	Napththylamine (2-)
NPW	SM 6410 B-00	Pentachloroethane
NPW	SM 6410 B-00	Napthoquinone (1,4-)
NPW	SM 6410 B-00	Methylphenol (4-)
NPW	SM 6410 B-00	Acetophenone
NPW	SM 6410 B-00	Alpha - terpineol
NPW	SM 6410 B-00	Aniline
NPW	SM 6410 B-00	Dichloroaniline (2,3-)
NPW	SM 6410 B-00	Methylphenol (2-)
NPW	SM 6410 B-00	Hexachlorocyclopentadiene
NPW	SM 6410 B-00	N-Nitrosodimethylamine
NPW	SM 6410 B-00	N-Nitrosodiphenylamine
NPW	SM 6410 B-00	Benzoic acid
NPW	SM 6410 B-00	Benzidine
NPW	SM 6410 B-00	Carbazole
NPW	SM 6410 B-00	Pyridine
NPW	SM 6410 B-00	Acenaphthene
NPW	SM 6410 B-00	Acenaphthylene

Matrix	Method	Parameter
NPW	SM 6410 B-00	Anthracene
NPW	SM 6410 B-00	Benzo(a)anthracene
NPW	SM 6410 B-00	Benzo(b)fluoranthene
NPW	SM 6410 B-00	Benzo(k)fluoranthene
NPW	SM 6410 B-00	Benzo(a)pyrene
NPW	SM 6410 B-00	Benzo(ghi)perylene
NPW	SM 6410 B-00	Butyl benzyl phthalate
NPW	SM 6410 B-00	Bis (2-chloroethyl) ether
NPW	SM 6410 B-00	Bis (2-chloroethoxy) methane
NPW	SM 6410 B-00	Bis (2-ethylhexyl) phthalate
NPW	SM 6410 B-00	Bis (2-chloroisopropyl) ether
NPW	SM 6410 B-00	Bromophenyl-phenyl ether (4-)
NPW	SM 6410 B-00	Chloronaphthalene (2-)
NPW	SM 6410 B-00	Chlorophenyl-phenyl ether (4-)
NPW	SM 6410 B-00	Chrysene
NPW	SM 6410 B-00	Dibenzo(a,h)anthracene
NPW	SM 6410 B-00	Di-n-butyl phthalate
NPW	SM 6410 B-00	Dichlorobenzidine (3,3'-)
NPW	SM 6410 B-00	Diethyl phthalate
NPW	SM 6410 B-00	Dimethyl phthalate
NPW	SM 6410 B-00	Dinitrotoluene (2,4-)
NPW	SM 6410 B-00	Dinitrotoluene (2,6-)
NPW	SM 6410 B-00	Di-n-octyl phthalate
NPW	SM 6410 B-00	Fluoranthene
NPW	SM 6410 B-00	Fluorene
NPW	SM 6410 B-00	Hexachlorobenzene
NPW	SM 6410 B-00	Hexachlorobutadiene (1,3-)
NPW	SM 6410 B-00	Hexachloroethane
NPW	SM 6410 B-00	Indeno(1,2,3-cd)pyrene
NPW	SM 6410 B-00	Isophorone
NPW	SM 6410 B-00	Naphthalene
NPW	SM 6410 B-00	Nitrobenzene
NPW	SM 6410 B-00	N-Nitroso-di-n-propylamine
NPW	SM 6410 B-00	Phenanthrene
NPW	SM 6410 B-00	Pyrene
NPW	SM 6410 B-00	Trichlorobenzene (1,2,4-)
NPW	SM 6410 B-00	Methyl phenol (4-chloro-3-)
NPW	SM 6410 B-00	Chlorophenol (2-)
NPW	SM 6410 B-00	Dichlorophenol (2,4-)
NPW	SM 6410 B-00	Dimethylphenol (2,4-)

Matrix	Method	Parameter
NPW	SM 6410 B-00	Dinitrophenol (2,4-)
NPW	SM 6410 B-00	Dinitrophenol (2-methyl-4,6-)
NPW	SM 6410 B-00	Nitrophenol (2-)
NPW	SM 6410 B-00	Nitrophenol (4-)
NPW	SM 6410 B-00	Pentachlorophenol
NPW	SM 6410 B-00	Phenol
NPW	SM 6410 B-00	Trichlorophenol (2,4,6-)
NPW	SM 6440 B-00	Acenaphthene
NPW	SM 6440 B-00	Acenaphthylene
NPW	SM 6440 B-00	Anthracene
NPW	SM 6440 B-00	Benzo(a)anthracene
NPW	SM 6440 B-00	Benzo(a)pyrene
NPW	SM 6440 B-00	Benzo(b)fluoranthene
NPW	SM 6440 B-00	Benzo(ghi)perylene
NPW	SM 6440 B-00	Benzo(k)fluoranthene
NPW	SM 6440 B-00	Chrysene
NPW	SM 6440 B-00	Dibenzo(a,h)anthracene
NPW	SM 6440 B-00	Fluoranthene
NPW	SM 6440 B-00	Fluorene
NPW	SM 6440 B-00	Indeno(1,2,3-cd)pyrene
NPW	SM 6440 B-00	Naphthalene
NPW	SM 6440 B-00	Phenanthrene
NPW	SM 6440 B-00	Pyrene
NPW	SM 6630 B-00	Trifluralin
NPW	SM 6630 B-00	Aldrin
NPW	SM 6630 B-00	Alpha BHC
NPW	SM 6630 B-00	Lindane (gamma BHC)
NPW	SM 6630 B-00	Chlordane
NPW	SM 6630 B-00	DDD (4,4'-)
NPW	SM 6630 B-00	DDE (4,4'-)
NPW	SM 6630 B-00	DDT (4,4'-)
NPW	SM 6630 B-00	Dieldrin
NPW	SM 6630 B-00	Endosulfan I
NPW	SM 6630 B-00	Endosulfan II
NPW	SM 6630 B-00	Endrin
NPW	SM 6630 B-00	Heptachlor
NPW	SM 6630 B-00	Heptachlor epoxide
NPW	SM 6630 B-00	Methoxychlor
NPW	SM 6630 B-00	Toxaphene
NPW	SM 6630C-00	Etridiazole

Matrix	Method	Parameter
NPW	SM 6630C-00	Aldrin
NPW	SM 6630C-00	Alpha BHC
NPW	SM 6630C-00	Beta BHC
NPW	SM 6630C-00	Delta BHC
NPW	SM 6630C-00	Lindane (gamma BHC)
NPW	SM 6630C-00	Chlordane
NPW	SM 6630C-00	DDD (4,4'-)
NPW	SM 6630C-00	DDE (4,4'-)
NPW	SM 6630C-00	DDT (4,4'-)
NPW	SM 6630C-00	Dieldrin
NPW	SM 6630C-00	Endosulfan I
NPW	SM 6630C-00	Endosulfan II
NPW	SM 6630C-00	Endosulfan sulfate
NPW	SM 6630C-00	Endrin
NPW	SM 6630C-00	Heptachlor
NPW	SM 6630C-00	Heptachlor epoxide
NPW	SM 6630C-00	Methoxychlor
NPW	SM 6630C-00	Toxaphene
NPW	SM 6640 B-01	D (2,4-)
NPW	SM 6640 B-01	Dalapon
NPW	SM 6640 B-01	T (2,4,5-)
NPW	SM 6640 B-01	TP (2,4,5-) (Silvex)
NPW	SM 9215 B-00	Heterotrophic plate count
NPW	SM 9222 B-97	Total coliform
NPW	SM 9222 D-97	Fecal coliform
NPW	SM 9222D-97 (Class B only) plus EPA 625/R-92/013 App. F	Fecal coliform
NPW	SW-846 1010	Ignitability
NPW	SW-846 1010A	Ignitability
NPW	SW-846 1110	Corrosiviety toward steel
NPW	SW-846 1110A	Corrosivity toward steel
NPW	SW-846 1310A	Metals - organics
NPW	SW-846 1310B	Metals - organics
NPW	SW-846 1311	Volatile organics
NPW	SW-846 1311	Semivolatile organics
NPW	SW-846 1311	Metals
NPW	SW-846 1312	Metals - organics
NPW	SW-846 1320	Metals - organics
NPW	SW-846 3005A	Metals, Total Rec and Dissolved

Matrix	Method	Parameter
NPW	SW-846 3010A	Metals, Total
NPW	SW-846 3015	Metals
NPW	SW-846 3015A	Metals
NPW	SW-846 3020A	Metals
NPW	SW-846 3510C	Semivolatile organics
NPW	SW-846 3511	Semivolatile organics
NPW	SW-846 3520C	Semivolatile organics
NPW	SW-846 5030B	Volatile organics
NPW	SW-846 6010B	Aluminum
NPW	SW-846 6010B	Antimony
NPW	SW-846 6010B	Arsenic
NPW	SW-846 6010B	Barium
NPW	SW-846 6010B	Beryllium
NPW	SW-846 6010B	Boron
NPW	SW-846 6010B	Cadmium
NPW	SW-846 6010B	Calcium
NPW	SW-846 6010B	Calcium-hardness
NPW	SW-846 6010B	Total hardness
NPW	SW-846 6010B	Chromium
NPW	SW-846 6010B	Cobalt
NPW	SW-846 6010B	Copper
NPW	SW-846 6010B	Iron
NPW	SW-846 6010B	Lead
NPW	SW-846 6010B	Lithium
NPW	SW-846 6010B	Magnesium
NPW	SW-846 6010B	Manganese
NPW	SW-846 6010B	Molybdenum
NPW	SW-846 6010B	Nickel
NPW	SW-846 6010B	Potassium
NPW	SW-846 6010B	Selenium
NPW	SW-846 6010B	Silica
NPW	SW-846 6010B	Silver
NPW	SW-846 6010B	Sulfur
NPW	SW-846 6010B	Sodium
NPW	SW-846 6010B	Strontium
NPW	SW-846 6010B	Thallium
NPW	SW-846 6010B	Tin
NPW	SW-846 6010B	Titanium
NPW	SW-846 6010B	Vanadium
NPW	SW-846 6010B	Zinc

Matrix	Method	Parameter
NPW	SW-846 6010C	Antimony
NPW	SW-846 6010C	Arsenic
NPW	SW-846 6010C	Barium
NPW	SW-846 6010C	Beryllium
NPW	SW-846 6010C	Boron
NPW	SW-846 6010C	Cadmium
NPW	SW-846 6010C	Calcium
NPW	SW-846 6010C	Calcium-hardness
NPW	SW-846 6010C	Total hardness
NPW	SW-846 6010C	Chromium
NPW	SW-846 6010C	Cobalt
NPW	SW-846 6010C	Copper
NPW	SW-846 6010C	Iron
NPW	SW-846 6010C	Lead
NPW	SW-846 6010C	Lithium
NPW	SW-846 6010C	Magnesium
NPW	SW-846 6010C	Manganese
NPW	SW-846 6010C	Molybdenum
NPW	SW-846 6010C	Nickel
NPW	SW-846 6010C	Potassium
NPW	SW-846 6010C	Selenium
NPW	SW-846 6010C	Silica
NPW	SW-846 6010C	Silver
NPW	SW-846 6010C	Sulfur
NPW	SW-846 6010C	Sodium
NPW	SW-846 6010C	Strontium
NPW	SW-846 6010C	Thallium
NPW	SW-846 6010C	Tin
NPW	SW-846 6010C	Titanium
NPW	SW-846 6010C	Vanadium
NPW	SW-846 6010C	Zinc
NPW	SW-846 6020	Aluminum
NPW	SW-846 6020	Antimony
NPW	SW-846 6020	Arsenic
NPW	SW-846 6020	Barium
NPW	SW-846 6020	Beryllium
NPW	SW-846 6020	Boron
NPW	SW-846 6020	Cadmium
NPW	SW-846 6020	Calcium
NPW	SW-846 6020	Chromium

Matrix	Method	Parameter
NPW	SW-846 6020	Cobalt
NPW	SW-846 6020	Copper
NPW	SW-846 6020	Iron
NPW	SW-846 6020	Lead
NPW	SW-846 6020	Magnesium
NPW	SW-846 6020	Manganese
NPW	SW-846 6020	Molybdenum
NPW	SW-846 6020	Nickel
NPW	SW-846 6020	Potassium
NPW	SW-846 6020	Selenium
NPW	SW-846 6020	Silver
NPW	SW-846 6020	Sodium
NPW	SW-846 6020	Strontium
NPW	SW-846 6020	Thallium
NPW	SW-846 6020	Thorium
NPW	SW-846 6020	Tin
NPW	SW-846 6020	Titanium
NPW	SW-846 6020	Uranium
NPW	SW-846 6020	Vanadium
NPW	SW-846 6020	Zinc
NPW	SW-846 6020A	Aluminum
NPW	SW-846 6020A	Antimony
NPW	SW-846 6020A	Arsenic
NPW	SW-846 6020A	Barium
NPW	SW-846 6020A	Beryllium
NPW	SW-846 6020A	Boron
NPW	SW-846 6020A	Cadmium
NPW	SW-846 6020A	Calcium
NPW	SW-846 6020A	Chromium
NPW	SW-846 6020A	Cobalt
NPW	SW-846 6020A	Copper
NPW	SW-846 6020A	Iron
NPW	SW-846 6020A	Lead
NPW	SW-846 6020A	Magnesium
NPW	SW-846 6020A	Manganese
NPW	SW-846 6020A	Molybdenum
NPW	SW-846 6020A	Nickel
NPW	SW-846 6020A	Potassium
NPW	SW-846 6020A	Selenium
NPW	SW-846 6020A	Silver

Matrix	Method	Parameter
NPW	SW-846 6020A	Sodium
NPW	SW-846 6020A	Strontium
NPW	SW-846 6020A	Thallium
NPW	SW-846 6020A	Thorium
NPW	SW-846 6020A	Tin
NPW	SW-846 6020A	Titanium
NPW	SW-846 6020A	Uranium
NPW	SW-846 6020A	Vanadium
NPW	SW-846 6020A	Zinc
NPW	SW-846 7196A	Chromium (VI)
NPW	SW-846 7199	Chromium (VI)
NPW	SW-846 7470A	Mercury - liquid waste
NPW	SW-846 8011	Dibromoethane (1,2-) (EDB)
NPW	SW-846 8011	Dibromo-3-chloropropane (1,2-)
NPW	SW-846 8015B	Ethylene glycol
NPW	SW-846 8015B	Propylene glycol
NPW	SW-846 8015B	Gasoline range organic
NPW	SW-846 8015B	Diesel range organic
NPW	SW-846 8015C	Ethylene glycol
NPW	SW-846 8015C	Propylene glycol
NPW	SW-846 8015D	Ethylene glycol
NPW	SW-846 8015D	Propylene glycol
NPW	SW-846 8015D	Gasoline range organic
NPW	SW-846 8015D	Diesel range organic
NPW	SW-846 8021B	Xylenes (total)
NPW	SW-846 8021B	Methyl tert-butyl ether
NPW	SW-846 8021B	Benzene
NPW	SW-846 8021B	Ethylbenzene
NPW	SW-846 8021B	Toluene
NPW	SW-846 8021B	Xylene (o-)
NPW	SW-846 8021B	Xylene (m-)
NPW	SW-846 8021B	Xylene (p-)
NPW	SW-846 8081A	Alachlor
NPW	SW-846 8081A	Chlordane (alpha)
NPW	SW-846 8081A	Chlordane (gamma)
NPW	SW-846 8081A	Chloroneb
NPW	SW-846 8081A	Chlorothalonil
NPW	SW-846 8081A	Etridiazole
NPW	SW-846 8081A	Hexachlorobenzene
NPW	SW-846 8081A	Hexachlorocyclopentadiene

Matrix	Method	Parameter
NPW	SW-846 8081A	Permethrin
NPW	SW-846 8081A	Propachlor
NPW	SW-846 8081A	Trifluralin
NPW	SW-846 8081A	Aldrin
NPW	SW-846 8081A	Alpha BHC
NPW	SW-846 8081A	Beta BHC
NPW	SW-846 8081A	Delta BHC
NPW	SW-846 8081A	Lindane (gamma BHC)
NPW	SW-846 8081A	Chlordane (technical)
NPW	SW-846 8081A	DDD (4,4'-)
NPW	SW-846 8081A	DDE (4,4'-)
NPW	SW-846 8081A	DDT (4,4'-)
NPW	SW-846 8081A	Dieldrin
NPW	SW-846 8081A	Endosulfan I
NPW	SW-846 8081A	Endosulfan II
NPW	SW-846 8081A	Endosulfan sulfate
NPW	SW-846 8081A	Endrin
NPW	SW-846 8081A	Endrin aldehyde
NPW	SW-846 8081A	Endrin ketone
NPW	SW-846 8081A	Heptachlor
NPW	SW-846 8081A	Heptachlor epoxide
NPW	SW-846 8081A	Methoxychlor
NPW	SW-846 8081A	Toxaphene
NPW	SW-846 8081B	Alachlor
NPW	SW-846 8081B	Chlordane (alpha)
NPW	SW-846 8081B	Chlordane (gamma)
NPW	SW-846 8081B	Chloroneb
NPW	SW-846 8081B	Chlorothalonil
NPW	SW-846 8081B	Etridiazole
NPW	SW-846 8081B	Hexachlorobenzene
NPW	SW-846 8081B	Hexachlorocyclopentadiene
NPW	SW-846 8081B	Permethrin
NPW	SW-846 8081B	Propachlor
NPW	SW-846 8081B	Trifluralin
NPW	SW-846 8081B	Aldrin
NPW	SW-846 8081B	Alpha BHC
NPW	SW-846 8081B	Beta BHC
NPW	SW-846 8081B	Delta BHC
NPW	SW-846 8081B	Lindane (gamma BHC)
NPW	SW-846 8081B	Chlordane (technical)

Matrix	Method	Parameter
NPW	SW-846 8081B	DDD (4,4'-)
NPW	SW-846 8081B	DDE (4,4'-)
NPW	SW-846 8081B	DDT (4,4'-)
NPW	SW-846 8081B	Dieldrin
NPW	SW-846 8081B	Endosulfan I
NPW	SW-846 8081B	Endosulfan II
NPW	SW-846 8081B	Endosulfan sulfate
NPW	SW-846 8081B	Endrin
NPW	SW-846 8081B	Endrin aldehyde
NPW	SW-846 8081B	Endrin ketone
NPW	SW-846 8081B	Heptachlor
NPW	SW-846 8081B	Heptachlor epoxide
NPW	SW-846 8081B	Methoxychlor
NPW	SW-846 8081B	Toxaphene
NPW	SW-846 8082	PCB 1016
NPW	SW-846 8082	PCB 1221
NPW	SW-846 8082	PCB 1232
NPW	SW-846 8082	PCB 1242
NPW	SW-846 8082	PCB 1248
NPW	SW-846 8082	PCB 1254
NPW	SW-846 8082	PCB 1260
NPW	SW-846 8082A	PCB 1016
NPW	SW-846 8082A	PCB 1221
NPW	SW-846 8082A	PCB 1232
NPW	SW-846 8082A	PCB 1242
NPW	SW-846 8082A	PCB 1248
NPW	SW-846 8082A	PCB 1254
NPW	SW-846 8082A	PCB 1260
NPW	SW-846 8141A	Azinphos methyl
NPW	SW-846 8141A	Chlorpyrifos
NPW	SW-846 8141A	Demeton (o-)
NPW	SW-846 8141A	Demeton (s-)
NPW	SW-846 8141A	Disulfoton
NPW	SW-846 8141A	Bolstar
NPW	SW-846 8141A	Coumaphos
NPW	SW-846 8141A	Dichlorvos
NPW	SW-846 8141A	Dimethoate
NPW	SW-846 8141A	EPN
NPW	SW-846 8141A	Ethoprop
NPW	SW-846 8141A	Fensulfothion

Matrix	Method	Parameter
NPW	SW-846 8141A	Fenthion
NPW	SW-846 8141A	Merphos
NPW	SW-846 8141A	Mevinphos
NPW	SW-846 8141A	Naled
NPW	SW-846 8141A	Parathion
NPW	SW-846 8141A	Parathion methyl
NPW	SW-846 8141A	Phorate
NPW	SW-846 8141A	Ronnel
NPW	SW-846 8141A	Stirofos
NPW	SW-846 8141A	Sulfotepp
NPW	SW-846 8141A	TEPP
NPW	SW-846 8141A	Tokuthion [Protothiofos]
NPW	SW-846 8141A	Trichloronate
NPW	SW-846 8141A	Diazinon
NPW	SW-846 8141A	Malathion
NPW	SW-846 8141B	Azinphos methyl
NPW	SW-846 8141B	Chlorpyrifos
NPW	SW-846 8141B	Demeton (o-)
NPW	SW-846 8141B	Demeton (s-)
NPW	SW-846 8141B	Disulfoton
NPW	SW-846 8141B	Bolstar
NPW	SW-846 8141B	Coumaphos
NPW	SW-846 8141B	Dichlorvos
NPW	SW-846 8141B	Dimethoate
NPW	SW-846 8141B	EPN
NPW	SW-846 8141B	Ethoprop
NPW	SW-846 8141B	Fensulfothion
NPW	SW-846 8141B	Fenthion
NPW	SW-846 8141B	Merphos
NPW	SW-846 8141B	Mevinphos
NPW	SW-846 8141B	Naled
NPW	SW-846 8141B	Parathion
NPW	SW-846 8141B	Parathion methyl
NPW	SW-846 8141B	Phorate
NPW	SW-846 8141B	Ronnel
NPW	SW-846 8141B	Stirofos
NPW	SW-846 8141B	Sulfotepp
NPW	SW-846 8141B	TEPP
NPW	SW-846 8141B	Tokuthion [Protothiofos]
NPW	SW-846 8141B	Trichloronate

Matrix	Method	Parameter
NPW	SW-846 8141B	Diazinon
NPW	SW-846 8141B	Malathion
NPW	SW-846 8151A	Dicamba
NPW	SW-846 8151A	DB (2,4-)
NPW	SW-846 8151A	Dinoseb
NPW	SW-846 8151A	Dalapon
NPW	SW-846 8151A	Dichlorprop
NPW	SW-846 8151A	D (2,4-)
NPW	SW-846 8151A	T (2,4,5-)
NPW	SW-846 8151A	TP (2,4,5-) (Silvex)
NPW	SW-846 8151A	MCPA
NPW	SW-846 8151A	MCPP
NPW	SW-846 8260B	Methyl alcohol (Methanol)
NPW	SW-846 8260B	Ethyl alcohol
NPW	SW-846 8260B	Hexane (n-)
NPW	SW-846 8260B	Trimethylpentane (2,2,4-)
NPW	SW-846 8260B	Methylnaphthalene (1-)
NPW	SW-846 8260B	Methylnaphthalene (2-)
NPW	SW-846 8260B	Butanol (3,3-Dimethyl-1-)
NPW	SW-846 8260B	Trimethylpentane (2,2,4-)
NPW	SW-846 8260B	Trimethylbenzene (1,2,3-)
NPW	SW-846 8260B	Cyclohexane
NPW	SW-846 8260B	Butanol (1-)
NPW	SW-846 8260B	Nitropropane (2-)
NPW	SW-846 8260B	Butyl formate (t-)
NPW	SW-846 8260B	Methyl acetate
NPW	SW-846 8260B	Pentanol (2-Methyl-2-)
NPW	SW-846 8260B	Amyl alcohol (t-)
NPW	SW-846 8260B	Methylcyclohexane
NPW	SW-846 8260B	Octane (-n)
NPW	SW-846 8260B	tert-Amylmethyl ether [TAME]
NPW	SW-846 8260B	Bromoethane
NPW	SW-846 8260B	Cyclohexanone
NPW	SW-846 8260B	Diisopropyl Ether [DIPE]
NPW	SW-846 8260B	Tetrahydrofuran
NPW	SW-846 8260B	Ethyl-tert-butyl Ether [ETBE]
NPW	SW-846 8260B	Safrole
NPW	SW-846 8260B	Xylene (m-)
NPW	SW-846 8260B	Xylene (o-)
NPW	SW-846 8260B	Xylene (p-)

Matrix	Method	Parameter
NPW	SW-846 8260B	Dichloro-2-butene (cis-1,4-)
NPW	SW-846 8260B	Diethyl ether (Ethyl ether)
NPW	SW-846 8260B	Dichloro-2-butene (trans-1,4-)
NPW	SW-846 8260B	Ethanol
NPW	SW-846 8260B	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
NPW	SW-846 8260B	Vinyl acetate
NPW	SW-846 8260B	Pentachloroethane
NPW	SW-846 8260B	Tert-butyl alcohol
NPW	SW-846 8260B	Dioxane (1,4-)
NPW	SW-846 8260B	Bromobenzene
NPW	SW-846 8260B	Butyl benzene (n-)
NPW	SW-846 8260B	Sec-butylbenzene
NPW	SW-846 8260B	Tert-butylbenzene
NPW	SW-846 8260B	Chlorotoluene (2-)
NPW	SW-846 8260B	Chlorotoluene (4-)
NPW	SW-846 8260B	Isopropylbenzene
NPW	SW-846 8260B	Propylbenzene (n-)
NPW	SW-846 8260B	Isopropyltoluene (4-)
NPW	SW-846 8260B	Trichlorobenzene (1,2,3-)
NPW	SW-846 8260B	Trimethylbenzene (1,2,4-)
NPW	SW-846 8260B	Trimethylbenzene (1,3,5-)
NPW	SW-846 8260B	Allyl chloride
NPW	SW-846 8260B	Bromochloromethane
NPW	SW-846 8260B	Butadiene (2-chloro-1,3-)
NPW	SW-846 8260B	Dibromoethane (1,2-) (EDB)
NPW	SW-846 8260B	Dibromomethane
NPW	SW-846 8260B	Dibromo-3-chloropropane (1,2-)
NPW	SW-846 8260B	Dichloropropane (1,3-)
NPW	SW-846 8260B	Dichloropropane (2,2-)
NPW	SW-846 8260B	Dichloropropene (1,1-)
NPW	SW-846 8260B	Trichloropropane (1,2,3-)
NPW	SW-846 8260B	Ethyl acetate
NPW	SW-846 8260B	Ethyl methacrylate
NPW	SW-846 8260B	Methacrylonitrile
NPW	SW-846 8260B	Methyl acrylate
NPW	SW-846 8260B	Methyl methacrylate
NPW	SW-846 8260B	Methyl iodide
NPW	SW-846 8260B	Iso-butyl alcohol
NPW	SW-846 8260B	Isopropanol
NPW	SW-846 8260B	N-Nitroso-di-n-butylamine

Matrix	Method	Parameter
NPW	SW-846 8260B	Propionitrile
NPW	SW-846 8260B	Acetonitrile
NPW	SW-846 8260B	Benzene
NPW	SW-846 8260B	Chlorobenzene
NPW	SW-846 8260B	Dichlorobenzene (1,2-)
NPW	SW-846 8260B	Dichlorobenzene (1,3-)
NPW	SW-846 8260B	Dichlorobenzene (1,4-)
NPW	SW-846 8260B	Ethylbenzene
NPW	SW-846 8260B	Toluene
NPW	SW-846 8260B	Xylenes (total)
NPW	SW-846 8260B	Bromodichloromethane
NPW	SW-846 8260B	Bromoform
NPW	SW-846 8260B	Bromomethane
NPW	SW-846 8260B	Carbon tetrachloride
NPW	SW-846 8260B	Chloroethane
NPW	SW-846 8260B	Chloroethyl vinyl ether (2-)
NPW	SW-846 8260B	Chloroform
NPW	SW-846 8260B	Chloromethane
NPW	SW-846 8260B	Dichloropropene (trans-1,3-)
NPW	SW-846 8260B	Dibromochloromethane
NPW	SW-846 8260B	Dichlorodifluoromethane
NPW	SW-846 8260B	Dichloroethane (1,1-)
NPW	SW-846 8260B	Dichloroethane (1,2-)
NPW	SW-846 8260B	Dichloroethene (1,1-)
NPW	SW-846 8260B	Dichloroethene (trans-1,2-)
NPW	SW-846 8260B	Dichloroethene (cis-1,2-)
NPW	SW-846 8260B	Dichloropropane (1,2-)
NPW	SW-846 8260B	Dichloropropene (cis-1,3-)
NPW	SW-846 8260B	Methylene chloride (Dichloromethane)
NPW	SW-846 8260B	Tetrachloroethane (1,1,2,2-)
NPW	SW-846 8260B	Tetrachloroethene
NPW	SW-846 8260B	Trichloroethane (1,1,1-)
NPW	SW-846 8260B	Trichloroethane (1,1,2-)
NPW	SW-846 8260B	Trichloroethene
NPW	SW-846 8260B	Trichlorofluoromethane
NPW	SW-846 8260B	Vinyl chloride
NPW	SW-846 8260B	Acetone
NPW	SW-846 8260B	Carbon disulfide
NPW	SW-846 8260B	Butanone (2-)
NPW	SW-846 8260B	Hexanone (2-)

Matrix	Method	Parameter
NPW	SW-846 8260B	Pentanone (4-methyl-2-) (MIBK)
NPW	SW-846 8260B	Methyl tert-butyl ether
NPW	SW-846 8260B	Acrolein
NPW	SW-846 8260B	Acrylonitrile
NPW	SW-846 8260B	Hexachlorobutadiene (1,3-)
NPW	SW-846 8260B	Hexachloroethane
NPW	SW-846 8260B	Naphthalene
NPW	SW-846 8260B	Styrene
NPW	SW-846 8260B	Tetrachloroethane (1,1,1,2-)
NPW	SW-846 8260B	Trichlorobenzene (1,2,4-)
NPW	SW-846 8260C	Methyl alcohol (Methanol)
NPW	SW-846 8260C	Ethyl alcohol
NPW	SW-846 8260C	Trimethylpentane (2,2,4-)
NPW	SW-846 8260C	Methylnaphthalene (1-)
NPW	SW-846 8260C	Methylnaphthalene (2-)
NPW	SW-846 8260C	Butanol (3,3-Dimethyl-1-)
NPW	SW-846 8260C	Trimethylbenzene (1,2,3-)
NPW	SW-846 8260C	Cyclohexane
NPW	SW-846 8260C	Butanol (1-)
NPW	SW-846 8260C	Nitropropane (2-)
NPW	SW-846 8260C	Butyl formate (t-)
NPW	SW-846 8260C	Methyl acetate
NPW	SW-846 8260C	Pentanol (2-Methyl-2-)
NPW	SW-846 8260C	Amyl alcohol (t-)
NPW	SW-846 8260C	Methylcyclohexane
NPW	SW-846 8260C	Octane (-n)
NPW	SW-846 8260C	tert-Amylmethyl ether [TAME]
NPW	SW-846 8260C	Bromoethane
NPW	SW-846 8260C	Cyclohexanone
NPW	SW-846 8260C	Diisopropyl Ether [DIPE]
NPW	SW-846 8260C	Tetrahydrofuran
NPW	SW-846 8260C	Ethyl-tert-butyl Ether [ETBE]
NPW	SW-846 8260C	Xylene (m-)
NPW	SW-846 8260C	Xylene (o-)
NPW	SW-846 8260C	Xylene (p-)
NPW	SW-846 8260C	Dichloro-2-butene (cis-1,4-)
NPW	SW-846 8260C	Diethyl ether (Ethyl ether)
NPW	SW-846 8260C	Dichloro-2-butene (trans-1,4-)
NPW	SW-846 8260C	Ethanol
NPW	SW-846 8260C	Trichloro (1,1,2-) trifluoroethane (1,2,2-)

Matrix	Method	Parameter
NPW	SW-846 8260C	Vinyl acetate
NPW	SW-846 8260C	Pentachloroethane
NPW	SW-846 8260C	Tert-butyl alcohol
NPW	SW-846 8260C	Dioxane (1,4-)
NPW	SW-846 8260C	Bromobenzene
NPW	SW-846 8260C	Butyl benzene (n-)
NPW	SW-846 8260C	Sec-butylbenzene
NPW	SW-846 8260C	Tert-butylbenzene
NPW	SW-846 8260C	Chlorotoluene (2-)
NPW	SW-846 8260C	Chlorotoluene (4-)
NPW	SW-846 8260C	Isopropylbenzene
NPW	SW-846 8260C	Propylbenzene (n-)
NPW	SW-846 8260C	Isopropyltoluene (4-)
NPW	SW-846 8260C	Trichlorobenzene (1,2,3-)
NPW	SW-846 8260C	Trimethylbenzene (1,2,4-)
NPW	SW-846 8260C	Trimethylbenzene (1,3,5-)
NPW	SW-846 8260C	Allyl chloride
NPW	SW-846 8260C	Bromochloromethane
NPW	SW-846 8260C	Butadiene (2-chloro-1,3-)
NPW	SW-846 8260C	Dibromoethane (1,2-) (EDB)
NPW	SW-846 8260C	Dibromomethane
NPW	SW-846 8260C	Dibromo-3-chloropropane (1,2-)
NPW	SW-846 8260C	Dichloropropane (1,3-)
NPW	SW-846 8260C	Dichloropropane (2,2-)
NPW	SW-846 8260C	Dichloropropene (1,1-)
NPW	SW-846 8260C	Trichloropropane (1,2,3-)
NPW	SW-846 8260C	Ethyl acetate
NPW	SW-846 8260C	Ethyl methacrylate
NPW	SW-846 8260C	Methacrylonitrile
NPW	SW-846 8260C	Methyl acrylate
NPW	SW-846 8260C	Methyl methacrylate
NPW	SW-846 8260C	Methyl iodide
NPW	SW-846 8260C	Iso-butyl alcohol
NPW	SW-846 8260C	Isopropanol
NPW	SW-846 8260C	N-Nitroso-di-n-butylamine
NPW	SW-846 8260C	Propionitrile
NPW	SW-846 8260C	Acetonitrile
NPW	SW-846 8260C	Benzene
NPW	SW-846 8260C	Chlorobenzene
NPW	SW-846 8260C	Dichlorobenzene (1,2-)

Matrix	Method	Parameter
NPW	SW-846 8260C	Dichlorobenzene (1,3-)
NPW	SW-846 8260C	Dichlorobenzene (1,4-)
NPW	SW-846 8260C	Ethylbenzene
NPW	SW-846 8260C	Toluene
NPW	SW-846 8260C	Xylenes (total)
NPW	SW-846 8260C	Bromodichloromethane
NPW	SW-846 8260C	Bromoform
NPW	SW-846 8260C	Bromomethane
NPW	SW-846 8260C	Carbon tetrachloride
NPW	SW-846 8260C	Chloroethane
NPW	SW-846 8260C	Chloroethyl vinyl ether (2-)
NPW	SW-846 8260C	Chloroform
NPW	SW-846 8260C	Chloromethane
NPW	SW-846 8260C	Dichloropropene (trans-1,3-)
NPW	SW-846 8260C	Dibromochloromethane
NPW	SW-846 8260C	Dichlorodifluoromethane
NPW	SW-846 8260C	Dichloroethane (1,1-)
NPW	SW-846 8260C	Dichloroethane (1,2-)
NPW	SW-846 8260C	Dichloroethene (1,1-)
NPW	SW-846 8260C	Dichloroethene (trans-1,2-)
NPW	SW-846 8260C	Dichloroethene (cis-1,2-)
NPW	SW-846 8260C	Dichloropropane (1,2-)
NPW	SW-846 8260C	Dichloropropene (cis-1,3-)
NPW	SW-846 8260C	Methylene chloride (Dichloromethane)
NPW	SW-846 8260C	Tetrachloroethane (1,1,2,2-)
NPW	SW-846 8260C	Tetrachloroethene
NPW	SW-846 8260C	Trichloroethane (1,1,1-)
NPW	SW-846 8260C	Trichloroethane (1,1,2-)
NPW	SW-846 8260C	Trichloroethene
NPW	SW-846 8260C	Trichlorofluoromethane
NPW	SW-846 8260C	Vinyl chloride
NPW	SW-846 8260C	Acetone
NPW	SW-846 8260C	Carbon disulfide
NPW	SW-846 8260C	Butanone (2-)
NPW	SW-846 8260C	Hexanone (2-)
NPW	SW-846 8260C	Pentanone (4-methyl-2-) (MIBK)
NPW	SW-846 8260C	Methyl tert-butyl ether
NPW	SW-846 8260C	Acrolein
NPW	SW-846 8260C	Acrylonitrile
NPW	SW-846 8260C	Hexachlorobutadiene (1,3-)

Matrix	Method	Parameter
NPW	SW-846 8260C	Hexachloroethane
NPW	SW-846 8260C	Naphthalene
NPW	SW-846 8260C	Styrene
NPW	SW-846 8260C	Tetrachloroethane (1,1,1,2-)
NPW	SW-846 8260C	Trichlorobenzene (1,2,4-)
NPW	SW-846 8270C	Biphenyl (1,1'-)
NPW	SW-846 8270C	Benzaldehyde
NPW	SW-846 8270C	Caprolactam
NPW	SW-846 8270C	Atrazine
NPW	SW-846 8270C	Phenanthrene
NPW	SW-846 8270C	Pyrene
NPW	SW-846 8270C	Acenaphthene
NPW	SW-846 8270C	Acenaphthylene
NPW	SW-846 8270C	Anthracene
NPW	SW-846 8270C	Benzo(ghi)perylene
NPW	SW-846 8270C	Chrysene
NPW	SW-846 8270C	Methylnaphthalene (1-)
NPW	SW-846 8270C	Methylnaphthalene (2-)
NPW	SW-846 8270C	Naphthalene
NPW	SW-846 8270C	Fluoranthene
NPW	SW-846 8270C	Fluorene
NPW	SW-846 8270C	Methylnaphthalene (1-)
NPW	SW-846 8270C	Nitrodiphenylamine (2-)
NPW	SW-846 8270C	Nitrodiphenylamine (2-)
NPW	SW-846 8270C	Hexachlorophene
NPW	SW-846 8270C	Diphenylhydrazine (1,2-)
NPW	SW-846 8270C	Decane (n-)
NPW	SW-846 8270C	Octadecane (n-)
NPW	SW-846 8270C	Benzo(a)anthracene
NPW	SW-846 8270C	Benzo(a)pyrene
NPW	SW-846 8270C	Benzo(b)fluoranthene
NPW	SW-846 8270C	Benzo(k)fluoranthene
NPW	SW-846 8270C	Dibenzo(a,h)anthracene
NPW	SW-846 8270C	Indeno(1,2,3-cd)pyrene
NPW	SW-846 8270C	Benzal chloride
NPW	SW-846 8270C	Benzo(j)fluoranthene
NPW	SW-846 8270C	Benzotrichloride
NPW	SW-846 8270C	Benzyl chloride
NPW	SW-846 8270C	Chlorobenzilate
NPW	SW-846 8270C	Dibenz(a,h)acridine

Matrix	Method	Parameter
NPW	SW-846 8270C	Dibenzo(a,h)pyrene
NPW	SW-846 8270C	Dibenzo(a,i)pyrene
NPW	SW-846 8270C	Dibenzo(c,g)carbazole (7H-)
NPW	SW-846 8270C	Pentachloroethane
NPW	SW-846 8270C	Tetrachlorobenzene (1,2,3,4-)
NPW	SW-846 8270C	Tetrachlorobenzene (1,2,3,5-)
NPW	SW-846 8270C	Benzyl alcohol
NPW	SW-846 8270C	Acetophenone
NPW	SW-846 8270C	Acetylaminofluorene (2-)
NPW	SW-846 8270C	Aminobiphenyl (4-)
NPW	SW-846 8270C	Aramite
NPW	SW-846 8270C	Chloronaphthalene (1-)
NPW	SW-846 8270C	Diallate (cis)
NPW	SW-846 8270C	Diallate (trans)
NPW	SW-846 8270C	Dibenzo(a,e)pyrene
NPW	SW-846 8270C	Dibenz(a,j)acridine
NPW	SW-846 8270C	Dichlorophenol (2,6-)
NPW	SW-846 8270C	Dimethoate
NPW	SW-846 8270C	Dimethylaminoazobenzene
NPW	SW-846 8270C	Dimethylbenz(a)anthracene (7,12-)
NPW	SW-846 8270C	Dimethyl benzidine (3,3-)
NPW	SW-846 8270C	Dinitrobenzene (1,3-)
NPW	SW-846 8270C	Dinoseb
NPW	SW-846 8270C	Disulfoton
NPW	SW-846 8270C	Famphur
NPW	SW-846 8270C	Hexachloropropene
NPW	SW-846 8270C	Isodrin
NPW	SW-846 8270C	Isosafrole (cis-)
NPW	SW-846 8270C	Isosafrole (trans-)
NPW	SW-846 8270C	Kepone
NPW	SW-846 8270C	Methanesulfonate (Ethyl-)
NPW	SW-846 8270C	Methanesulfonate (Methyl-)
NPW	SW-846 8270C	Methapyrilene
NPW	SW-846 8270C	Methylcholanthrene (3-)
NPW	SW-846 8270C	Napthoquinone (1,4-)
NPW	SW-846 8270C	Napththylamine (1-)
NPW	SW-846 8270C	Napththylamine (2-)
NPW	SW-846 8270C	N-Nitroso-di-n-butylamine
NPW	SW-846 8270C	N-Nitrosomorpholine
NPW	SW-846 8270C	N-Nitrosopiperidine

Matrix	Method	Parameter
NPW	SW-846 8270C	Parathion
NPW	SW-846 8270C	Parathion methyl
NPW	SW-846 8270C	Pentachlorobenzene
NPW	SW-846 8270C	Pentachloronitrobenzene
NPW	SW-846 8270C	Phenacetin
NPW	SW-846 8270C	Phenylenediamine (1,4-)
NPW	SW-846 8270C	Phenylethylamine (alpha, alpha-Dimethyl)
NPW	SW-846 8270C	Phorate
NPW	SW-846 8270C	Phosphorothioate (O,O,O-triethyl)
NPW	SW-846 8270C	Phosphorothioate (O,O-diethyl-O-2-pyrazinyl) [Thionazin]
NPW	SW-846 8270C	Picoline (2-)
NPW	SW-846 8270C	Pronamide
NPW	SW-846 8270C	Quinoline -1-Oxide (4-Nitro)
NPW	SW-846 8270C	Safrole
NPW	SW-846 8270C	Sulfotepp
NPW	SW-846 8270C	Tetrachlorobenzene (1,2,4,5-)
NPW	SW-846 8270C	Tetrachlorophenol (2,3,4,6-)
NPW	SW-846 8270C	Toluidine (2-) (2-Methylaniline)
NPW	SW-846 8270C	Toluidine (5-nitro-2-)
NPW	SW-846 8270C	Trinitrobenzene (1,3,5-)
NPW	SW-846 8270C	N-Nitrosodiethylamine
NPW	SW-846 8270C	N-Nitrosopyrrolidine
NPW	SW-846 8270C	Diphenylamine
NPW	SW-846 8270C	Carbazole
NPW	SW-846 8270C	Dichlorobenzene (1,2-)
NPW	SW-846 8270C	Dichlorobenzene (1,3-)
NPW	SW-846 8270C	N-Nitrosodimethylamine
NPW	SW-846 8270C	N-Nitroso-di-n-propylamine
NPW	SW-846 8270C	N-Nitrosomethylethylamine
NPW	SW-846 8270C	Benzidine
NPW	SW-846 8270C	Aniline
NPW	SW-846 8270C	Hexachloropropene
NPW	SW-846 8270C	Dibenzofuran
NPW	SW-846 8270C	Benzoic acid
NPW	SW-846 8270C	N-Nitrosodiphenylamine
NPW	SW-846 8270C	Dichlorobenzidine (3,3'-)
NPW	SW-846 8270C	Chloroaniline (4-)
NPW	SW-846 8270C	Nitroaniline (2-)
NPW	SW-846 8270C	Nitroaniline (3-)

Matrix	Method	Parameter
NPW	SW-846 8270C	Nitroaniline (4-)
NPW	SW-846 8270C	Chloronaphthalene (2-)
NPW	SW-846 8270C	Hexachlorobenzene
NPW	SW-846 8270C	Hexachlorobutadiene (1,3-)
NPW	SW-846 8270C	Hexachlorocyclopentadiene
NPW	SW-846 8270C	Hexachloroethane
NPW	SW-846 8270C	Trichlorobenzene (1,2,4-)
NPW	SW-846 8270C	Bis (2-chloroethoxy) methane
NPW	SW-846 8270C	Bis (2-chloroethyl) ether
NPW	SW-846 8270C	Bis (2-chloroisopropyl) ether
NPW	SW-846 8270C	Chlorophenyl-phenyl ether (4-)
NPW	SW-846 8270C	Bromophenyl-phenyl ether (4-)
NPW	SW-846 8270C	Dinitrotoluene (2,4-)
NPW	SW-846 8270C	Dinitrotoluene (2,6-)
NPW	SW-846 8270C	Isophorone
NPW	SW-846 8270C	Nitrobenzene
NPW	SW-846 8270C	Butyl benzyl phthalate
NPW	SW-846 8270C	Bis (2-ethylhexyl) phthalate
NPW	SW-846 8270C	Diethyl phthalate
NPW	SW-846 8270C	Dimethyl phthalate
NPW	SW-846 8270C	Di-n-butyl phthalate
NPW	SW-846 8270C	Di-n-octyl phthalate
NPW	SW-846 8270C	Acenaphthene
NPW	SW-846 8270C	Anthracene
NPW	SW-846 8270C	Acenaphthylene
NPW	SW-846 8270C	Benzo(a)anthracene
NPW	SW-846 8270C	Benzo(a)pyrene
NPW	SW-846 8270C	Benzo(b)fluoranthene
NPW	SW-846 8270C	Benzo(ghi)perylene
NPW	SW-846 8270C	Benzo(k)fluoranthene
NPW	SW-846 8270C	Chrysene
NPW	SW-846 8270C	Dibenzo(a,h)anthracene
NPW	SW-846 8270C	Fluoranthene
NPW	SW-846 8270C	Fluorene
NPW	SW-846 8270C	Indeno(1,2,3-cd)pyrene
NPW	SW-846 8270C	Methylnaphthalene (2-)
NPW	SW-846 8270C	Naphthalene
NPW	SW-846 8270C	Phenanthrene
NPW	SW-846 8270C	Pyrene
NPW	SW-846 8270C	Methyl phenol (4-chloro-3-)

Matrix	Method	Parameter
NPW	SW-846 8270C	Chlorophenol (2-)
NPW	SW-846 8270C	Dichlorophenol (2,4-)
NPW	SW-846 8270C	Dimethylphenol (2,4-)
NPW	SW-846 8270C	Dinitrophenol (2,4-)
NPW	SW-846 8270C	Dinitrophenol (2-methyl-4,6-)
NPW	SW-846 8270C	Methylphenol (2-)
NPW	SW-846 8270C	Methylphenol (4-)
NPW	SW-846 8270C	Nitrophenol (2-)
NPW	SW-846 8270C	Nitrophenol (4-)
NPW	SW-846 8270C	Pentachlorophenol
NPW	SW-846 8270C	Phenol
NPW	SW-846 8270C	Trichlorophenol (2,4,5-)
NPW	SW-846 8270C	Trichlorophenol (2,4,6-)
NPW	SW-846 8270C	Dichlorobenzene (1,4-)
NPW	SW-846 8270C	Pyridine
NPW	SW-846 8270C	Dioxane (1,4-)
NPW	SW-846 8270D	Biphenyl (1,1'-)
NPW	SW-846 8270D	Benzaldehyde
NPW	SW-846 8270D	Caprolactam
NPW	SW-846 8270D	Atrazine
NPW	SW-846 8270D	Phenanthrene
NPW	SW-846 8270D	Pyrene
NPW	SW-846 8270D	Acenaphthene
NPW	SW-846 8270D	Acenaphthylene
NPW	SW-846 8270D	Anthracene
NPW	SW-846 8270D	Benzo(ghi)perylene
NPW	SW-846 8270D	Chrysene
NPW	SW-846 8270D	Methylnaphthalene (1-)
NPW	SW-846 8270D	Methylnaphthalene (2-)
NPW	SW-846 8270D	Naphthalene
NPW	SW-846 8270D	Fluoranthene
NPW	SW-846 8270D	Fluorene
NPW	SW-846 8270D	Methylnaphthalene (1-)
NPW	SW-846 8270D	Nitrodiphenylamine (2-)
NPW	SW-846 8270D	Hexachlorophene
NPW	SW-846 8270D	Diphenylhydrazine (1,2-)
NPW	SW-846 8270D	Decane (n-)
NPW	SW-846 8270D	Octadecane (n-)
NPW	SW-846 8270D	Benzo(a)anthracene
NPW	SW-846 8270D	Benzo(a)pyrene

Matrix	Method	Parameter
NPW	SW-846 8270D	Benzo(b)fluoranthene
NPW	SW-846 8270D	Benzo(k)fluoranthene
NPW	SW-846 8270D	Dibenzo(a,h)anthracene
NPW	SW-846 8270D	Indeno(1,2,3-cd)pyrene
NPW	SW-846 8270D	Benzal chloride
NPW	SW-846 8270D	Benzo(j)fluoranthene
NPW	SW-846 8270D	Benzotrichloride
NPW	SW-846 8270D	Benzyl chloride
NPW	SW-846 8270D	Chlorobenzilate
NPW	SW-846 8270D	Dibenz(a,h)acridine
NPW	SW-846 8270D	Dibenzo(a,h)pyrene
NPW	SW-846 8270D	Dibenzo(a,i)pyrene
NPW	SW-846 8270D	Dibenzo(c,g)carbazole (7H-)
NPW	SW-846 8270D	Pentachloroethane
NPW	SW-846 8270D	Tetrachlorobenzene (1,2,3,4-)
NPW	SW-846 8270D	Tetrachlorobenzene (1,2,3,5-)
NPW	SW-846 8270D	Benzyl alcohol
NPW	SW-846 8270D	Acetophenone
NPW	SW-846 8270D	Acetylaminofluorene (2-)
NPW	SW-846 8270D	Aminobiphenyl (4-)
NPW	SW-846 8270D	Aramite
NPW	SW-846 8270D	Chloronaphthalene (1-)
NPW	SW-846 8270D	Diallate (cis)
NPW	SW-846 8270D	Diallate (trans)
NPW	SW-846 8270D	Dibenzo(a,e)pyrene
NPW	SW-846 8270D	Dibenz(a,j)acridine
NPW	SW-846 8270D	Dichlorophenol (2,6-)
NPW	SW-846 8270D	Dimethoate
NPW	SW-846 8270D	Dimethylaminoazobenzene
NPW	SW-846 8270D	Dimethylbenz(a)anthracene (7,12-)
NPW	SW-846 8270D	Dimethyl benzidine (3,3-)
NPW	SW-846 8270D	Dinitrobenzene (1,3-)
NPW	SW-846 8270D	Dinoseb
NPW	SW-846 8270D	Disulfoton
NPW	SW-846 8270D	Famphur
NPW	SW-846 8270D	Isodrin
NPW	SW-846 8270D	Isosafrole (cis-)
NPW	SW-846 8270D	Isosafrole (trans-)
NPW	SW-846 8270D	Kepone
NPW	SW-846 8270D	Methanesulfonate (Ethyl-)

Matrix	Method	Parameter
NPW	SW-846 8270D	Methanesulfonate (Methyl-)
NPW	SW-846 8270D	Methapyrilene
NPW	SW-846 8270D	Methylcholanthrene (3-)
NPW	SW-846 8270D	Napthoquinone (1,4-)
NPW	SW-846 8270D	Napththylamine (1-)
NPW	SW-846 8270D	Napththylamine (2-)
NPW	SW-846 8270D	N-Nitroso-di-n-butylamine
NPW	SW-846 8270D	N-Nitrosomorpholine
NPW	SW-846 8270D	N-Nitrosopiperidine
NPW	SW-846 8270D	Parathion
NPW	SW-846 8270D	Parathion methyl
NPW	SW-846 8270D	Pentachlorobenzene
NPW	SW-846 8270D	Pentachloronitrobenzene
NPW	SW-846 8270D	Phenacetin
NPW	SW-846 8270D	Phenylenediamine (1,4-)
NPW	SW-846 8270D	Phenylethylamine (alpha, alpha-Dimethyl)
NPW	SW-846 8270D	Phorate
NPW	SW-846 8270D	Phosphorothioate (O,O,O-triethyl)
NPW	SW-846 8270D	Phosphorothioate (O,O-diethyl-O-2-pyrazinyl) [Thionazin]
NPW	SW-846 8270D	Picoline (2-)
NPW	SW-846 8270D	Pronamide
NPW	SW-846 8270D	Quinoline -1-Oxide (4-Nitro)
NPW	SW-846 8270D	Safrole
NPW	SW-846 8270D	Sulfotepp
NPW	SW-846 8270D	Tetrachlorobenzene (1,2,4,5-)
NPW	SW-846 8270D	Tetrachlorophenol (2,3,4,6-)
NPW	SW-846 8270D	Toluidine (2-) (2-Methylaniline)
NPW	SW-846 8270D	Toluidine (5-nitro-2-)
NPW	SW-846 8270D	Trinitrobenzene (1,3,5-)
NPW	SW-846 8270D	N-Nitrosodiethylamine
NPW	SW-846 8270D	N-Nitrosopyrrolidine
NPW	SW-846 8270D	Diphenylamine
NPW	SW-846 8270D	Carbazole
NPW	SW-846 8270D	Dichlorobenzene (1,2-)
NPW	SW-846 8270D	Dichlorobenzene (1,3-)
NPW	SW-846 8270D	N-Nitrosodimethylamine
NPW	SW-846 8270D	N-Nitroso-di-n-propylamine
NPW	SW-846 8270D	N-Nitrosomethylethylamine
NPW	SW-846 8270D	Benzidine

Matrix	Method	Parameter
NPW	SW-846 8270D	Aniline
NPW	SW-846 8270D	Hexachloropropene
NPW	SW-846 8270D	Dibenzofuran
NPW	SW-846 8270D	Benzoic acid
NPW	SW-846 8270D	N-Nitrosodiphenylamine
NPW	SW-846 8270D	Dichlorobenzidine (3,3'-)
NPW	SW-846 8270D	Chloroaniline (4-)
NPW	SW-846 8270D	Nitroaniline (2-)
NPW	SW-846 8270D	Nitroaniline (3-)
NPW	SW-846 8270D	Nitroaniline (4-)
NPW	SW-846 8270D	Chloronaphthalene (2-)
NPW	SW-846 8270D	Hexachlorobenzene
NPW	SW-846 8270D	Hexachlorobutadiene (1,3-)
NPW	SW-846 8270D	Hexachlorocyclopentadiene
NPW	SW-846 8270D	Hexachloroethane
NPW	SW-846 8270D	Trichlorobenzene (1,2,4-)
NPW	SW-846 8270D	Bis (2-chloroethoxy) methane
NPW	SW-846 8270D	Bis (2-chloroethyl) ether
NPW	SW-846 8270D	Bis (2-chloroisopropyl) ether
NPW	SW-846 8270D	Chlorophenyl-phenyl ether (4-)
NPW	SW-846 8270D	Bromophenyl-phenyl ether (4-)
NPW	SW-846 8270D	Dinitrotoluene (2,4-)
NPW	SW-846 8270D	Dinitrotoluene (2,6-)
NPW	SW-846 8270D	Isophorone
NPW	SW-846 8270D	Nitrobenzene
NPW	SW-846 8270D	Butyl benzyl phthalate
NPW	SW-846 8270D	Bis (2-ethylhexyl) phthalate
NPW	SW-846 8270D	Diethyl phthalate
NPW	SW-846 8270D	Dimethyl phthalate
NPW	SW-846 8270D	Di-n-butyl phthalate
NPW	SW-846 8270D	Di-n-octyl phthalate
NPW	SW-846 8270D	Acenaphthene
NPW	SW-846 8270D	Anthracene
NPW	SW-846 8270D	Acenaphthylene
NPW	SW-846 8270D	Benzo(a)anthracene
NPW	SW-846 8270D	Benzo(a)pyrene
NPW	SW-846 8270D	Benzo(b)fluoranthene
NPW	SW-846 8270D	Benzo(ghi)perylene
NPW	SW-846 8270D	Benzo(k)fluoranthene
NPW	SW-846 8270D	Chrysene

Matrix	Method	Parameter
NPW	SW-846 8270D	Dibenzo(a,h)anthracene
NPW	SW-846 8270D	Fluoranthene
NPW	SW-846 8270D	Fluorene
NPW	SW-846 8270D	Indeno(1,2,3-cd)pyrene
NPW	SW-846 8270D	Methylnaphthalene (2-)
NPW	SW-846 8270D	Naphthalene
NPW	SW-846 8270D	Phenanthrene
NPW	SW-846 8270D	Pyrene
NPW	SW-846 8270D	Methyl phenol (4-chloro-3-)
NPW	SW-846 8270D	Chlorophenol (2-)
NPW	SW-846 8270D	Dichlorophenol (2,4-)
NPW	SW-846 8270D	Dimethylphenol (2,4-)
NPW	SW-846 8270D	Dinitrophenol (2,4-)
NPW	SW-846 8270D	Dinitrophenol (2-methyl-4,6-)
NPW	SW-846 8270D	Methylphenol (2-)
NPW	SW-846 8270D	Methylphenol (4-)
NPW	SW-846 8270D	Nitrophenol (2-)
NPW	SW-846 8270D	Nitrophenol (4-)
NPW	SW-846 8270D	Pentachlorophenol
NPW	SW-846 8270D	Phenol
NPW	SW-846 8270D	Trichlorophenol (2,4,5-)
NPW	SW-846 8270D	Trichlorophenol (2,4,6-)
NPW	SW-846 8270D	Dichlorobenzene (1,4-)
NPW	SW-846 8270D	Pyridine
NPW	SW-846 8270D	Dioxane (1,4-)
NPW	SW-846 8310	Acenaphthene
NPW	SW-846 8310	Acenaphthylene
NPW	SW-846 8310	Anthracene
NPW	SW-846 8310	Benzo(a)anthracene
NPW	SW-846 8310	Benzo(a)pyrene
NPW	SW-846 8310	Benzo(b)fluoranthene
NPW	SW-846 8310	Benzo(ghi)perylene
NPW	SW-846 8310	Benzo(k)fluoranthene
NPW	SW-846 8310	Chrysene
NPW	SW-846 8310	Dibenzo(a,h)anthracene
NPW	SW-846 8310	Fluoranthene
NPW	SW-846 8310	Fluorene
NPW	SW-846 8310	Indeno(1,2,3-cd)pyrene
NPW	SW-846 8310	Naphthalene
NPW	SW-846 8310	Phenanthrene

Matrix	Method	Parameter
NPW	SW-846 8310	Pyrene
NPW	SW-846 8330	Nitroglycerine
NPW	SW-846 8330	Guanidine nitrate
NPW	SW-846 8330	PETN
NPW	SW-846 8330	HMX
NPW	SW-846 8330	RDX
NPW	SW-846 8330	Trinitrobenzene (1,3,5-)
NPW	SW-846 8330	Dinitrobenzene (1,3-)
NPW	SW-846 8330	Tetryl
NPW	SW-846 8330	Nitrobenzene
NPW	SW-846 8330	Trinitrotoluene (2,4,6-)
NPW	SW-846 8330	Dinitrotoluene (4-amino-2,6-)
NPW	SW-846 8330	Dinitrotoluene (2-amino-4,6-)
NPW	SW-846 8330	Dinitrotoluene (2,4-)
NPW	SW-846 8330	Dinitrotoluene (2,6-)
NPW	SW-846 8330	Nitrotoluene (2-)
NPW	SW-846 8330	Nitrotoluene (3-)
NPW	SW-846 8330	Nitrotoluene (4-)
NPW	SW-846 8330A	Nitroglycerine
NPW	SW-846 8330A	PETN
NPW	SW-846 8330A	HMX
NPW	SW-846 8330A	RDX
NPW	SW-846 8330A	Trinitrobenzene (1,3,5-)
NPW	SW-846 8330A	Dinitrobenzene (1,3-)
NPW	SW-846 8330A	Tetryl
NPW	SW-846 8330A	Nitrobenzene
NPW	SW-846 8330A	Trinitrotoluene (2,4,6-)
NPW	SW-846 8330A	Dinitrotoluene (4-amino-2,6-)
NPW	SW-846 8330A	Dinitrotoluene (2-amino-4,6-)
NPW	SW-846 8330A	Dinitrotoluene (2,4-)
NPW	SW-846 8330A	Dinitrotoluene (2,6-)
NPW	SW-846 8330A	Nitrotoluene (2-)
NPW	SW-846 8330A	Nitrotoluene (3-)
NPW	SW-846 8330A	Nitrotoluene (4-)
NPW	SW-846 9010C	Cyanide - amenable to Cl2
NPW	SW-846 9010C	Cyanide
NPW	SW-846 9012B	Cyanide
NPW	SW-846 9020B	Total organic halides (TOX)
NPW	SW-846 9030B	Sulfides, acid sol. & insol.
NPW	SW-846 9034	Sulfides, acid sol. & insol.

Matrix	Method	Parameter
NPW	SW-846 9040B	Corrosivity - pH waste, >20% water
NPW	SW-846 9040B	pH
NPW	SW-846 9040C	Corrosivity - pH waste, >20% water
NPW	SW-846 9040C	pH
NPW	SW-846 9040C	pH - waste, >20% water
NPW	SW-846 9050A	Specific conductance
NPW	SW-846 9056	Bromide
NPW	SW-846 9056	Nitrite
NPW	SW-846 9056	Sulfate
NPW	SW-846 9056	Nitrate
NPW	SW-846 9056	Chloride
NPW	SW-846 9056	Fluoride
NPW	SW-846 9056A	Bromide
NPW	SW-846 9056A	Nitrite
NPW	SW-846 9056A	Sulfate
NPW	SW-846 9056A	Nitrate
NPW	SW-846 9056A	Chloride
NPW	SW-846 9056A	Fluoride
NPW	SW-846 9060	Total organic carbon (TOC)
NPW	SW-846 9060A	Total organic carbon (TOC)
NPW	SW-846 9066	Phenols
NPW	User Defined 5030C	Volatile organics
NPW	User Defined 8260C	Hexane (n-)
NPW	User Defined 9010B	Cyanide - amenable to Cl_2
NPW	User Defined 9010B	Cyanide
NPW	User Defined 9012A	Cyanide
NPW	User Defined ASTM D93	Ignitability
NPW	User Defined CA LUFT - diesel	Petroleum Organics
NPW	User Defined CA LUFT - diesel	Petroleum Organics
NPW	User Defined EPA 1657	Parathion ethyl
NPW	User Defined EPA 1657	Azinphos methyl
NPW	User Defined EPA 1657	Demeton (o-)
NPW	User Defined EPA 1657	Demeton (s-)
NPW	User Defined EPA 1657	Diazinon
NPW	User Defined EPA 1657	Disulfoton
NPW	User Defined EPA 1657	Malathion
NPW	User Defined EPA 1657	Parathion methyl
NPW	User Defined EPA	Nitrocellulose

Matrix	Method	Parameter
	353.2 Modified	
NPW	User Defined EPA 624	Dichlorodifluoromethane
NPW	User Defined LUFT	Xylene (m-)
NPW	User Defined LUFT	Xylene (o-)
NPW	User Defined LUFT	Xylene (p-)
NPW	User Defined LUFT	Benzene
NPW	User Defined LUFT	Ethylbenzene
NPW	User Defined LUFT	Toluene
NPW	User Defined LUFT	Xylenes (total)
NPW	User Defined LUFT	Methyl tert-butyl ether
NPW	User Defined MA-DEP-EPH, TN-EPH, WI DRO, NW TPH Dx	Diesel range organic
NPW	User Defined MA-DEP-VPH, WI GRO, NW TPH Gx	Gasoline range organic
NPW	User Defined NWTPH-Dx, NWTPH-Gx, NWTPHID	Petroleum Organics
NPW	User Defined SM 6200 B-97	Butanone (2-)
NPW	User Defined SM 6200 B-97	Carbon disulfide
NPW	User Defined SM 6200 B-97	Isopropanol
NPW	User Defined SM 6200 B-97	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
NPW	User Defined SM 6200 B-97	Vinyl acetate
NPW	User Defined SM 6200 B-97	Acetonitrile
NPW	User Defined SM 6200 B-97	Hexanone (2-)
NPW	User Defined SM 6200 B-97	Methyl iodide
NPW	User Defined SM 6200 B-97	Dibromoethane (1,2-) (EDB)
NPW	User Defined SM 6200 B-97	Dichlorodifluoromethane
NPW	User Defined SM 6200 B-97	Dichloroethene (cis-1,2-)
NPW	User Defined SM 6200 B-97	Hexane (n-)
NPW	User Defined SM 6200 B-97	Methyl isobutyl ketone (MIBK)

Matrix	Method	Parameter
NPW	User Defined SM 6200 B-97	Tetrahydrofuran
NPW	User Defined SM 6200 B-97	Styrene
NPW	User Defined SM 6200 B-97	Xylene (o-)
NPW	User Defined SM 6200 B-97	Acetone
NPW	User Defined SM 6200 B-97	Ethyl acetate
NPW	User Defined SM 6200 B-97	Methyl tert-butyl ether
NPW	User Defined SM 6200 B-97	Tert-butyl alcohol
NPW	User Defined SM 6200 B-97	Xylenes (total)
NPW	User Defined SM 6200 B-97	Benzene
NPW	User Defined SM 6200 B-97	Bromodichloromethane
NPW	User Defined SM 6200 B-97	Bromoform
NPW	User Defined SM 6200 B-97	Bromomethane
NPW	User Defined SM 6200 B-97	Carbon tetrachloride
NPW	User Defined SM 6200 B-97	Chlorobenzene
NPW	User Defined SM 6200 B-97	Chloroethane
NPW	User Defined SM 6200 B-97	Chloroethyl vinyl ether (2-)
NPW	User Defined SM 6200 B-97	Chloroform
NPW	User Defined SM 6200 B-97	Chloromethane
NPW	User Defined SM 6200 B-97	Dibromochloromethane
NPW	User Defined SM 6200 B-97	Dichlorobenzene (1,2-)
NPW	User Defined SM 6200 B-97	Dichlorobenzene (1,3-)
NPW	User Defined SM 6200 B-97	Dichlorobenzene (1,4-)
NPW	User Defined SM 6200 B-97	Dichloroethane (1,1-)
NPW	User Defined SM 6200	Dichloroethane (1,2-)

Matrix	Method	Parameter
	B-97	
NPW	User Defined SM 6200 B-97	Dichloroethene (1,1-)
NPW	User Defined SM 6200 B-97	Dichloroethene (trans-1,2-)
NPW	User Defined SM 6200 B-97	Dichloropropane (1,2-)
NPW	User Defined SM 6200 B-97	Dichloropropene (cis-1,3-)
NPW	User Defined SM 6200 B-97	Dichloropropene (trans-1,3-)
NPW	User Defined SM 6200 B-97	Ethylbenzene
NPW	User Defined SM 6200 B-97	Methylene chloride (Dichloromethane)
NPW	User Defined SM 6200 B-97	Tetrachloroethane (1,1,2,2-)
NPW	User Defined SM 6200 B-97	Tetrachloroethene
NPW	User Defined SM 6200 B-97	Toluene
NPW	User Defined SM 6200 B-97	Trichloroethane (1,1,1-)
NPW	User Defined SM 6200 B-97	Trichloroethane (1,1,2-)
NPW	User Defined SM 6200 B-97	Trichloroethene
NPW	User Defined SM 6200 B-97	Trichlorofluoromethane
NPW	User Defined SM 6200 B-97	Vinyl chloride
NPW	User Defined SM 6200C-97	Benzene
NPW	User Defined SM 6200C-97	Ethylbenzene
NPW	User Defined SM 6200C-97	Methyl tert-butyl ether
NPW	User Defined SM 6200C-97	Tert-butyl alcohol
NPW	User Defined SM 6200C-97	Toluene
NPW	User Defined SM 6200C-97	Xylenes (total)
NPW	User Defined SM 6630C-00	Chlordane (alpha)
NPW	User Defined SM 6630C-00	Chlordane (gamma)

Matrix	Method	Parameter
NPW	User Defined SM 6630C-00	Hexachlorobenzene
NPW	User Defined SM 6630C-00	Endrin aldehyde
NPW	User Defined SM 6630C-00	Endrin ketone
NPW	User Defined SM 6640B-01	Dinoseb
NPW	User Defined SM 6640B-01	Dicamba
NPW	User Defined SW846 8260B & 8260C	Gasoline range organic
NPW	User Defined SW-846 8330	Nitroguanidine
NPW	User Defined TX 1005, TX 1006, CT ETPH, NW TPH ID	Petroleum Organics
SCM	EPA 314.0-mod	Perchlorate
SCM	ASTM D240	Heat of combustion (BTU)
SCM	ASTM D5468 and D482	% ash
SCM	ASTM F1647-02A	Total organic carbon (TOC)
SCM	EPA 300.0	Guanidine nitrate
SCM	Other FL - PRO	Petroleum Organics
SCM	Other IA - OA-1	Petroleum Organics
SCM	Other IA - OA-2	Petroleum Organics
SCM	Other NJ DEP EPH 10/08, Rev. 3	Extractable Petroleum Hydrocarbons
SCM	Other NJ-OQA-QAM-025, Rev. 7	Petroleum Organics
SCM	Other USDA-LOI (Loss on ignition)	Total organic carbon (TOC)
SCM	Other Walkley Black	Total organic carbon (TOC)
SCM	SM 2540 G SM 18th Ed.	Total, fixed, and volatile solids (SQAR)
SCM	SM 9222D-97 (Class B only) plus EPA 625/R-92/013 App. F	Fecal coliform
SCM	SW-846 1010	Ignitability
SCM	SW-846 1010A	Ignitability
SCM	SW-846 1030	Ignitability of solids
SCM	SW-846 1110	Corrosivity toward steel
SCM	SW-846 1110A	Corrosivity toward steel
SCM	SW-846 1310A	Metals - organics
SCM	SW-846 1310B	Metals - organics

Matrix	Method	Parameter
SCM	SW-846 1311	Volatile organics
SCM	SW-846 1311	Semivolatile organics
SCM	SW-846 1311	Metals
SCM	SW-846 1312	Metals - organics
SCM	SW-846 1320	Metals - organics
SCM	SW-846 3031	Metals
SCM	SW-846 3040A	Metals
SCM	SW-846 3050B	Metals
SCM	SW-846 3051	Metals
SCM	SW-846 3051A	Metals
SCM	SW-846 3052	Metals
SCM	SW-846 3060A	Metals
SCM	SW-846 3540C	Semivolatile organics
SCM	SW-846 3546	Semivolatile organics
SCM	SW-846 3550B	Semivolatile organics
SCM	SW-846 3550C	Semivolatile organics
SCM	SW-846 3580A	Organics
SCM	SW-846 3585	Organics
SCM	SW-846 3610B	Semivolatile organics
SCM	SW-846 3611B	Semivolatile organics
SCM	SW-846 3620B	Semivolatile organics
SCM	SW-846 3620C	Semivolatile organics
SCM	SW-846 3630C	Semivolatile organics
SCM	SW-846 3660B	Semivolatile organics
SCM	SW-846 3665A	Semivolatile organics
SCM	SW-846 5035A-H	Volatile organics - high conc.
SCM	SW-846 5035A-L	Volatile organics - low conc.
SCM	SW-846 5035H	Volatile organics - high conc.
SCM	SW-846 5035L	Volatile organics - low conc.
SCM	SW-846 6010B	Aluminum
SCM	SW-846 6010B	Antimony
SCM	SW-846 6010B	Arsenic
SCM	SW-846 6010B	Barium
SCM	SW-846 6010B	Beryllium
SCM	SW-846 6010B	Boron
SCM	SW-846 6010B	Cadmium
SCM	SW-846 6010B	Calcium
SCM	SW-846 6010B	Calcium-hardness
SCM	SW-846 6010B	Total hardness
SCM	SW-846 6010B	Chromium

Matrix	Method	Parameter
SCM	SW-846 6010B	Cobalt
SCM	SW-846 6010B	Copper
SCM	SW-846 6010B	Iron
SCM	SW-846 6010B	Lead
SCM	SW-846 6010B	Lithium
SCM	SW-846 6010B	Magnesium
SCM	SW-846 6010B	Manganese
SCM	SW-846 6010B	Molybdenum
SCM	SW-846 6010B	Nickel
SCM	SW-846 6010B	Potassium
SCM	SW-846 6010B	Selenium
SCM	SW-846 6010B	Silica
SCM	SW-846 6010B	Silver
SCM	SW-846 6010B	Sulfur
SCM	SW-846 6010B	Sodium
SCM	SW-846 6010B	Strontium
SCM	SW-846 6010B	Thallium
SCM	SW-846 6010B	Tin
SCM	SW-846 6010B	Titanium
SCM	SW-846 6010B	Vanadium
SCM	SW-846 6010B	Zinc
SCM	SW-846 6010C	Aluminum
SCM	SW-846 6010C	Antimony
SCM	SW-846 6010C	Arsenic
SCM	SW-846 6010C	Barium
SCM	SW-846 6010C	Beryllium
SCM	SW-846 6010C	Boron
SCM	SW-846 6010C	Cadmium
SCM	SW-846 6010C	Calcium
SCM	SW-846 6010C	Calcium-hardness
SCM	SW-846 6010C	Total hardness
SCM	SW-846 6010C	Chromium
SCM	SW-846 6010C	Cobalt
SCM	SW-846 6010C	Copper
SCM	SW-846 6010C	Iron
SCM	SW-846 6010C	Lead
SCM	SW-846 6010C	Lithium
SCM	SW-846 6010C	Magnesium
SCM	SW-846 6010C	Manganese
SCM	SW-846 6010C	Molybdenum

Matrix	Method	Parameter
SCM	SW-846 6010C	Nickel
SCM	SW-846 6010C	Potassium
SCM	SW-846 6010C	Selenium
SCM	SW-846 6010C	Silica
SCM	SW-846 6010C	Silver
SCM	SW-846 6010C	Sulfur
SCM	SW-846 6010C	Sodium
SCM	SW-846 6010C	Strontium
SCM	SW-846 6010C	Thallium
SCM	SW-846 6010C	Tin
SCM	SW-846 6010C	Titanium
SCM	SW-846 6010C	Vanadium
SCM	SW-846 6010C	Zinc
SCM	SW-846 6020	Aluminum
SCM	SW-846 6020	Antimony
SCM	SW-846 6020	Arsenic
SCM	SW-846 6020	Barium
SCM	SW-846 6020	Beryllium
SCM	SW-846 6020	Boron
SCM	SW-846 6020	Cadmium
SCM	SW-846 6020	Calcium
SCM	SW-846 6020	Chromium
SCM	SW-846 6020	Cobalt
SCM	SW-846 6020	Copper
SCM	SW-846 6020	Iron
SCM	SW-846 6020	Lead
SCM	SW-846 6020	Magnesium
SCM	SW-846 6020	Manganese
SCM	SW-846 6020	Molybdenum
SCM	SW-846 6020	Nickel
SCM	SW-846 6020	Potassium
SCM	SW-846 6020	Selenium
SCM	SW-846 6020	Silver
SCM	SW-846 6020	Sodium
SCM	SW-846 6020	Strontium
SCM	SW-846 6020	Thallium
SCM	SW-846 6020	Thorium
SCM	SW-846 6020	Tin
SCM	SW-846 6020	Titanium
SCM	SW-846 6020	Uranium

Matrix	Method	Parameter
SCM	SW-846 6020	Vanadium
SCM	SW-846 6020	Zinc
SCM	SW-846 6020A	Aluminum
SCM	SW-846 6020A	Antimony
SCM	SW-846 6020A	Arsenic
SCM	SW-846 6020A	Barium
SCM	SW-846 6020A	Beryllium
SCM	SW-846 6020A	Boron
SCM	SW-846 6020A	Cadmium
SCM	SW-846 6020A	Calcium
SCM	SW-846 6020A	Chromium
SCM	SW-846 6020A	Cobalt
SCM	SW-846 6020A	Copper
SCM	SW-846 6020A	Iron
SCM	SW-846 6020A	Lead
SCM	SW-846 6020A	Magnesium
SCM	SW-846 6020A	Manganese
SCM	SW-846 6020A	Molybdenum
SCM	SW-846 6020A	Nickel
SCM	SW-846 6020A	Potassium
SCM	SW-846 6020A	Selenium
SCM	SW-846 6020A	Silver
SCM	SW-846 6020A	Sodium
SCM	SW-846 6020A	Strontium
SCM	SW-846 6020A	Thallium
SCM	SW-846 6020A	Thorium
SCM	SW-846 6020A	Tin
SCM	SW-846 6020A	Titanium
SCM	SW-846 6020A	Uranium
SCM	SW-846 6020A	Vanadium
SCM	SW-846 6020A	Zinc
SCM	SW-846 7.3.3.2	Reactivity
SCM	SW-846 7.3.4.2	Reactivity
SCM	SW-846 7196A	Chromium (VI)
SCM	SW-846 7199	Chromium (VI)
SCM	SW-846 7471A	Mercury - solid waste
SCM	SW-846 7471B	Mercury - solid waste
SCM	SW-846 8011	Dibromoethane (1,2-) (EDB)
SCM	SW-846 8011	Dibromo-3-chloropropane (1,2-)
SCM	SW-846 8015B	Ethylene glycol

Matrix	Method	Parameter
SCM	SW-846 8015B	Propylene glycol
SCM	SW-846 8015B	Gasoline range organic
SCM	SW-846 8015B	Diesel range organic
SCM	SW-846 8015C	Ethylene glycol
SCM	SW-846 8015C	Propylene glycol
SCM	SW-846 8015D	Ethylene glycol
SCM	SW-846 8015D	Propylene glycol
SCM	SW-846 8015D	Gasoline range organic
SCM	SW-846 8015D	Diesel range organic
SCM	SW-846 8021B	Xylenes (total)
SCM	SW-846 8021B	Methyl tert-butyl ether
SCM	SW-846 8021B	Benzene
SCM	SW-846 8021B	Ethylbenzene
SCM	SW-846 8021B	Toluene
SCM	SW-846 8021B	Xylene (o-)
SCM	SW-846 8021B	Xylene (m-)
SCM	SW-846 8021B	Xylene (p-)
SCM	SW-846 8081A	Alachlor
SCM	SW-846 8081A	Chlordane (alpha)
SCM	SW-846 8081A	Chlordane (gamma)
SCM	SW-846 8081A	Chloroneb
SCM	SW-846 8081A	Chlorothalonil
SCM	SW-846 8081A	Etridiazole
SCM	SW-846 8081A	Hexachlorobenzene
SCM	SW-846 8081A	Hexachlorocyclopentadiene
SCM	SW-846 8081A	Permethrin
SCM	SW-846 8081A	Propachlor
SCM	SW-846 8081A	Trifluralin
SCM	SW-846 8081A	Aldrin
SCM	SW-846 8081A	Alpha BHC
SCM	SW-846 8081A	Beta BHC
SCM	SW-846 8081A	Delta BHC
SCM	SW-846 8081A	Lindane (gamma BHC)
SCM	SW-846 8081A	Chlordane (technical)
SCM	SW-846 8081A	DDD (4,4'-)
SCM	SW-846 8081A	DDE (4,4'-)
SCM	SW-846 8081A	DDT (4,4'-)
SCM	SW-846 8081A	Dieldrin
SCM	SW-846 8081A	Endosulfan I
SCM	SW-846 8081A	Endosulfan II

Matrix	Method	Parameter
SCM	SW-846 8081A	Endosulfan sulfate
SCM	SW-846 8081A	Endrin
SCM	SW-846 8081A	Endrin aldehyde
SCM	SW-846 8081A	Endrin ketone
SCM	SW-846 8081A	Heptachlor
SCM	SW-846 8081A	Heptachlor epoxide
SCM	SW-846 8081A	Methoxychlor
SCM	SW-846 8081A	Toxaphene
SCM	SW-846 8081B	Alachlor
SCM	SW-846 8081B	Chlordane (alpha)
SCM	SW-846 8081B	Chlordane (gamma)
SCM	SW-846 8081B	Chloroneb
SCM	SW-846 8081B	Chlorothalonil
SCM	SW-846 8081B	Etridiazole
SCM	SW-846 8081B	Hexachlorobenzene
SCM	SW-846 8081B	Hexachlorocyclopentadiene
SCM	SW-846 8081B	Permethrin
SCM	SW-846 8081B	Propachlor
SCM	SW-846 8081B	Trifluralin
SCM	SW-846 8081B	Aldrin
SCM	SW-846 8081B	Alpha BHC
SCM	SW-846 8081B	Beta BHC
SCM	SW-846 8081B	Delta BHC
SCM	SW-846 8081B	Lindane (gamma BHC)
SCM	SW-846 8081B	Chlordane (technical)
SCM	SW-846 8081B	DDD (4,4'-)
SCM	SW-846 8081B	DDE (4,4'-)
SCM	SW-846 8081B	DDT (4,4'-)
SCM	SW-846 8081B	Dieldrin
SCM	SW-846 8081B	Endosulfan I
SCM	SW-846 8081B	Endosulfan II
SCM	SW-846 8081B	Endosulfan sulfate
SCM	SW-846 8081B	Endrin
SCM	SW-846 8081B	Endrin aldehyde
SCM	SW-846 8081B	Endrin ketone
SCM	SW-846 8081B	Heptachlor
SCM	SW-846 8081B	Heptachlor epoxide
SCM	SW-846 8081B	Methoxychlor
SCM	SW-846 8081B	Toxaphene
SCM	SW-846 8082	PCB 1016

Matrix	Method	Parameter
SCM	SW-846 8082	PCB 1221
SCM	SW-846 8082	PCB 1232
SCM	SW-846 8082	PCB 1242
SCM	SW-846 8082	PCB 1248
SCM	SW-846 8082	PCB 1254
SCM	SW-846 8082	PCB 1260
SCM	SW-846 8082A	PCB 1016
SCM	SW-846 8082A	PCB 1221
SCM	SW-846 8082A	PCB 1232
SCM	SW-846 8082A	PCB 1242
SCM	SW-846 8082A	PCB 1248
SCM	SW-846 8082A	PCB 1254
SCM	SW-846 8082A	PCB 1260
SCM	SW-846 8141A	Azinphos methyl
SCM	SW-846 8141A	Chlorpyrifos
SCM	SW-846 8141A	Demeton (o-)
SCM	SW-846 8141A	Demeton (s-)
SCM	SW-846 8141A	Disulfoton
SCM	SW-846 8141A	Bolstar
SCM	SW-846 8141A	Coumaphos
SCM	SW-846 8141A	Dichlorvos
SCM	SW-846 8141A	Dimethoate
SCM	SW-846 8141A	EPN
SCM	SW-846 8141A	Ethoprop
SCM	SW-846 8141A	Fensulfothion
SCM	SW-846 8141A	Fenthion
SCM	SW-846 8141A	Merphos
SCM	SW-846 8141A	Mevinphos
SCM	SW-846 8141A	Naled
SCM	SW-846 8141A	Parathion
SCM	SW-846 8141A	Parathion methyl
SCM	SW-846 8141A	Phorate
SCM	SW-846 8141A	Ronnel
SCM	SW-846 8141A	Stirofos
SCM	SW-846 8141A	Sulfotepp
SCM	SW-846 8141A	TEPP
SCM	SW-846 8141A	Tokuthion [Protothiofos]
SCM	SW-846 8141A	Trichloronate
SCM	SW-846 8141A	Diazinon
SCM	SW-846 8141A	Malathion

Matrix	Method	Parameter
SCM	SW-846 8141B	Azinphos methyl
SCM	SW-846 8141B	Chlorpyrifos
SCM	SW-846 8141B	Demeton (o-)
SCM	SW-846 8141B	Demeton (s-)
SCM	SW-846 8141B	Disulfoton
SCM	SW-846 8141B	Bolstar
SCM	SW-846 8141B	Coumaphos
SCM	SW-846 8141B	Dichlorvos
SCM	SW-846 8141B	Dimethoate
SCM	SW-846 8141B	EPN
SCM	SW-846 8141B	Ethoprop
SCM	SW-846 8141B	Fensulfothion
SCM	SW-846 8141B	Fenthion
SCM	SW-846 8141B	Merphos
SCM	SW-846 8141B	Mevinphos
SCM	SW-846 8141B	Naled
SCM	SW-846 8141B	Parathion
SCM	SW-846 8141B	Parathion methyl
SCM	SW-846 8141B	Phorate
SCM	SW-846 8141B	Ronnel
SCM	SW-846 8141B	Stirofos
SCM	SW-846 8141B	Sulfotepp
SCM	SW-846 8141B	TEPP
SCM	SW-846 8141B	Tokuthion [Protothiofos]
SCM	SW-846 8141B	Trichloronate
SCM	SW-846 8141B	Diazinon
SCM	SW-846 8141B	Malathion
SCM	SW-846 8151A	Dicamba
SCM	SW-846 8151A	DB (2,4-)
SCM	SW-846 8151A	Dinoseb
SCM	SW-846 8151A	Dalapon
SCM	SW-846 8151A	Dichlorprop
SCM	SW-846 8151A	D (2,4-)
SCM	SW-846 8151A	T (2,4,5-)
SCM	SW-846 8151A	TP (2,4,5-) (Silvex)
SCM	SW-846 8151A	MCPA
SCM	SW-846 8151A	MCPP
SCM	SW-846 8015M	Methyl alcohol (Methanol)
SCM	SW-846 8260B	Ethyl alcohol
SCM	SW-846 8260B	Hexane (n-)

Matrix	Method	Parameter
SCM	SW-846 8260B	Methylnaphthalene (1-)
SCM	SW-846 8260B	Methylnaphthalene (2-)
SCM	SW-846 8260B	Butanol (3,3-Dimethyl-1-)
SCM	SW-846 8260B	Trimethylpentane (2,2,4-)
SCM	SW-846 8260B	Trimethylbenzene (1,2,3-)
SCM	SW-846 8260B	Cyclohexane
SCM	SW-846 8260B	Butanol (1-)
SCM	SW-846 8260B	Nitropropane (2-)
SCM	SW-846 8260B	Butyl formate (t-)
SCM	SW-846 8260B	Methyl acetate
SCM	SW-846 8260B	Amyl alcohol (t-)
SCM	SW-846 8260B	Methylcyclohexane
SCM	SW-846 8260B	Octane (-n)
SCM	SW-846 8260B	tert-Amyl Methyl Ether [TAME]
SCM	SW-846 8260B	Bromoethane
SCM	SW-846 8260B	Cyclohexanone
SCM	SW-846 8260B	Diisopropyl Ether [DIPE]
SCM	SW-846 8260B	Tetrahydrofuran
SCM	SW-846 8260B	Ethyl-tert-butyl Ether [ETBE]
SCM	SW-846 8260B	Xylene (m-)
SCM	SW-846 8260B	Xylene (o-)
SCM	SW-846 8260B	Xylene (p-)
SCM	SW-846 8260B	Dichloro-2-butene (cis-1,4-)
SCM	SW-846 8260B	Diethyl ether (Ethyl ether)
SCM	SW-846 8260B	Dichloro-2-butene (trans-1,4-)
SCM	SW-846 8260B	Ethanol
SCM	SW-846 8260B	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
SCM	SW-846 8260B	Vinyl acetate
SCM	SW-846 8260B	Pentachloroethane
SCM	SW-846 8260B	Tert-butyl alcohol
SCM	SW-846 8260B	Dioxane (1,4-)
SCM	SW-846 8260B	Bromobenzene
SCM	SW-846 8260B	Butyl benzene (n-)
SCM	SW-846 8260B	Sec-butylbenzene
SCM	SW-846 8260B	Tert-butylbenzene
SCM	SW-846 8260B	Chlorotoluene (2-)
SCM	SW-846 8260B	Chlorotoluene (4-)
SCM	SW-846 8260B	Isopropylbenzene
SCM	SW-846 8260B	Propylbenzene (n-)
SCM	SW-846 8260B	Isopropyltoluene (4-)

Matrix	Method	Parameter
SCM	SW-846 8260B	Trichlorobenzene (1,2,3-)
SCM	SW-846 8260B	Trimethylbenzene (1,2,4-)
SCM	SW-846 8260B	Trimethylbenzene (1,3,5-)
SCM	SW-846 8260B	Allyl chloride
SCM	SW-846 8260B	Bromochloromethane
SCM	SW-846 8260B	Butadiene (2-chloro-1,3-)
SCM	SW-846 8260B	Dibromoethane (1,2-) (EDB)
SCM	SW-846 8260B	Dibromomethane
SCM	SW-846 8260B	Dibromo-3-chloropropane (1,2-)
SCM	SW-846 8260B	Dichloropropane (1,3-)
SCM	SW-846 8260B	Dichloropropane (2,2-)
SCM	SW-846 8260B	Dichloropropene (1,1-)
SCM	SW-846 8260B	Trichloropropane (1,2,3-)
SCM	SW-846 8260B	Ethyl acetate
SCM	SW-846 8260B	Ethyl methacrylate
SCM	SW-846 8260B	Methacrylonitrile
SCM	SW-846 8260B	Methyl acrylate
SCM	SW-846 8260B	Methyl methacrylate
SCM	SW-846 8260B	Iso-butyl alcohol
SCM	SW-846 8260B	Isopropanol
SCM	SW-846 8260B	N-Nitroso-di-n-butylamine
SCM	SW-846 8260B	Propionitrile
SCM	SW-846 8260B	Acetonitrile
SCM	SW-846 8260B	Benzene
SCM	SW-846 8260B	Chlorobenzene
SCM	SW-846 8260B	Dichlorobenzene (1,2-)
SCM	SW-846 8260B	Dichlorobenzene (1,3-)
SCM	SW-846 8260B	Dichlorobenzene (1,4-)
SCM	SW-846 8260B	Ethylbenzene
SCM	SW-846 8260B	Toluene
SCM	SW-846 8260B	Xylenes (total)
SCM	SW-846 8260B	Bromodichloromethane
SCM	SW-846 8260B	Bromoform
SCM	SW-846 8260B	Bromomethane
SCM	SW-846 8260B	Carbon tetrachloride
SCM	SW-846 8260B	Chloroethane
SCM	SW-846 8260B	Chloroethyl vinyl ether (2-)
SCM	SW-846 8260B	Chloroform
SCM	SW-846 8260B	Chloromethane
SCM	SW-846 8260B	Dichloropropene (trans-1,3-)

Matrix	Method	Parameter
SCM	SW-846 8260B	Dibromochloromethane
SCM	SW-846 8260B	Dichlorodifluoromethane
SCM	SW-846 8260B	Dichloroethane (1,1-)
SCM	SW-846 8260B	Dichloroethane (1,2-)
SCM	SW-846 8260B	Dichloroethene (1,1-)
SCM	SW-846 8260B	Dichloroethene (trans-1,2-)
SCM	SW-846 8260B	Dichloroethene (cis-1,2-)
SCM	SW-846 8260B	Dichloropropane (1,2-)
SCM	SW-846 8260B	Dichloropropene (cis-1,3-)
SCM	SW-846 8260B	Methylene chloride (Dichloromethane)
SCM	SW-846 8260B	Tetrachloroethane (1,1,2,2-)
SCM	SW-846 8260B	Tetrachloroethene
SCM	SW-846 8260B	Trichloroethane (1,1,1-)
SCM	SW-846 8260B	Trichloroethane (1,1,2-)
SCM	SW-846 8260B	Trichloroethene
SCM	SW-846 8260B	Trichlorofluoromethane
SCM	SW-846 8260B	Vinyl chloride
SCM	SW-846 8260B	Acetone
SCM	SW-846 8260B	Carbon disulfide
SCM	SW-846 8260B	Butanone (2-)
SCM	SW-846 8260B	Hexanone (2-)
SCM	SW-846 8260B	Pentanone (4-methyl-2-) (MIBK)
SCM	SW-846 8260B	Methyl tert-butyl ether
SCM	SW-846 8260B	Acrolein
SCM	SW-846 8260B	Acrylonitrile
SCM	SW-846 8260B	Hexachlorobutadiene (1,3-)
SCM	SW-846 8260B	Hexachloroethane
SCM	SW-846 8260B	Naphthalene
SCM	SW-846 8260B	Styrene
SCM	SW-846 8260B	Tetrachloroethane (1,1,1,2-)
SCM	SW-846 8260B	Trichlorobenzene (1,2,4-)
SCM	SW-846 8260C	Ethyl alcohol
SCM	SW-846 8260C	Methylnaphthalene (1-)
SCM	SW-846 8260C	Methylnaphthalene (2-)
SCM	SW-846 8260C	Butanol (3,3-Dimethyl-1-)
SCM	SW-846 8260C	Trimethylbenzene (1,2,3-)
SCM	SW-846 8260C	Cyclohexane
SCM	SW-846 8260C	Butanol (1-)
SCM	SW-846 8260C	Nitropropane (2-)
SCM	SW-846 8260C	Butyl formate (t-)

Matrix	Method	Parameter
SCM	SW-846 8260C	Methyl acetate
SCM	SW-846 8260C	Pentanol (2-Methyl-2-)
SCM	SW-846 8260C	Amyl alcohol (t-)
SCM	SW-846 8260C	Methylcyclohexane
SCM	SW-846 8260C	Octane (-n)
SCM	SW-846 8260C	tert-Amylmethyl ether [TAME]
SCM	SW-846 8260C	Bromoethane
SCM	SW-846 8260C	Cyclohexanone
SCM	SW-846 8260C	Diisopropyl Ether [DIPE]
SCM	SW-846 8260C	Tetrahydrofuran
SCM	SW-846 8260C	Ethyl-tert-butyl Ether [ETBE]
SCM	SW-846 8260C	Xylene (m-)
SCM	SW-846 8260C	Xylene (o-)
SCM	SW-846 8260C	Xylene (p-)
SCM	SW-846 8260C	Dichloro-2-butene (cis-1,4-)
SCM	SW-846 8260C	Diethyl ether (Ethyl ether)
SCM	SW-846 8260C	Dichloro-2-butene (trans-1,4-)
SCM	SW-846 8260C	Trichloro (1,1,2-) trifluoroethane (1,2,2-)
SCM	SW-846 8260C	Vinyl acetate
SCM	SW-846 8260C	Pentachloroethane
SCM	SW-846 8260C	Tert-butyl alcohol
SCM	SW-846 8260C	Dioxane (1,4-)
SCM	SW-846 8260C	Bromobenzene
SCM	SW-846 8260C	Butyl benzene (n-)
SCM	SW-846 8260C	Sec-butylbenzene
SCM	SW-846 8260C	Tert-butylbenzene
SCM	SW-846 8260C	Chlorotoluene (2-)
SCM	SW-846 8260C	Chlorotoluene (4-)
SCM	SW-846 8260C	Isopropylbenzene
SCM	SW-846 8260C	Propylbenzene (n-)
SCM	SW-846 8260C	Isopropyltoluene (4-)
SCM	SW-846 8260C	Trichlorobenzene (1,2,3-)
SCM	SW-846 8260C	Trimethylbenzene (1,2,4-)
SCM	SW-846 8260C	Trimethylbenzene (1,3,5-)
SCM	SW-846 8260C	Allyl chloride
SCM	SW-846 8260C	Bromochloromethane
SCM	SW-846 8260C	Butadiene (2-chloro-1,3-)
SCM	SW-846 8260C	Dibromoethane (1,2-) (EDB)
SCM	SW-846 8260C	Dibromomethane
SCM	SW-846 8260C	Dibromo-3-chloropropane (1,2-)

Matrix	Method	Parameter
SCM	SW-846 8260C	Dichloropropane (1,3-)
SCM	SW-846 8260C	Dichloropropane (2,2-)
SCM	SW-846 8260C	Dichloropropene (1,1-)
SCM	SW-846 8260C	Trichloropropane (1,2,3-)
SCM	SW-846 8260C	Ethyl acetate
SCM	SW-846 8260C	Ethyl methacrylate
SCM	SW-846 8260C	Methacrylonitrile
SCM	SW-846 8260C	Methyl acrylate
SCM	SW-846 8260C	Methyl methacrylate
SCM	SW-846 8260C	Iso-butyl alcohol
SCM	SW-846 8260C	Isopropanol
SCM	SW-846 8260C	N-Nitroso-di-n-butylamine
SCM	SW-846 8260C	Propionitrile
SCM	SW-846 8260C	Acetonitrile
SCM	SW-846 8260C	Benzene
SCM	SW-846 8260C	Chlorobenzene
SCM	SW-846 8260C	Dichlorobenzene (1,2-)
SCM	SW-846 8260C	Dichlorobenzene (1,3-)
SCM	SW-846 8260C	Dichlorobenzene (1,4-)
SCM	SW-846 8260C	Ethylbenzene
SCM	SW-846 8260C	Toluene
SCM	SW-846 8260C	Xylenes (total)
SCM	SW-846 8260C	Bromodichloromethane
SCM	SW-846 8260C	Bromoform
SCM	SW-846 8260C	Bromomethane
SCM	SW-846 8260C	Carbon tetrachloride
SCM	SW-846 8260C	Chloroethane
SCM	SW-846 8260C	Chloroethyl vinyl ether (2-)
SCM	SW-846 8260C	Chloroform
SCM	SW-846 8260C	Chloromethane
SCM	SW-846 8260C	Dichloropropene (trans-1,3-)
SCM	SW-846 8260C	Dibromochloromethane
SCM	SW-846 8260C	Dichlorodifluoromethane
SCM	SW-846 8260C	Dichloroethane (1,1-)
SCM	SW-846 8260C	Dichloroethane (1,2-)
SCM	SW-846 8260C	Dichloroethene (1,1-)
SCM	SW-846 8260C	Dichloroethene (trans-1,2-)
SCM	SW-846 8260C	Dichloroethene (cis-1,2-)
SCM	SW-846 8260C	Dichloropropane (1,2-)
SCM	SW-846 8260C	Dichloropropene (cis-1,3-)

Matrix	Method	Parameter
SCM	SW-846 8260C	Methylene chloride (Dichloromethane)
SCM	SW-846 8260C	Tetrachloroethane (1,1,2,2-)
SCM	SW-846 8260C	Tetrachloroethene
SCM	SW-846 8260C	Trichloroethane (1,1,1-)
SCM	SW-846 8260C	Trichloroethane (1,1,2-)
SCM	SW-846 8260C	Trichloroethene
SCM	SW-846 8260C	Trichlorofluoromethane
SCM	SW-846 8260C	Vinyl chloride
SCM	SW-846 8260C	Acetone
SCM	SW-846 8260C	Carbon disulfide
SCM	SW-846 8260C	Butanone (2-)
SCM	SW-846 8260C	Hexanone (2-)
SCM	SW-846 8260C	Pentanone (4-methyl-2-) (MIBK)
SCM	SW-846 8260C	Methyl tert-butyl ether
SCM	SW-846 8260C	Acrolein
SCM	SW-846 8260C	Acrylonitrile
SCM	SW-846 8260C	Hexachlorobutadiene (1,3-)
SCM	SW-846 8260C	Hexachloroethane
SCM	SW-846 8260C	Naphthalene
SCM	SW-846 8260C	Styrene
SCM	SW-846 8260C	Tetrachloroethane (1,1,1,2-)
SCM	SW-846 8260C	Trichlorobenzene (1,2,4-)
SCM	SW-846 8270C	Biphenyl (1,1'-)
SCM	SW-846 8270C	Caprolactam
SCM	SW-846 8270C	Atrazine
SCM	SW-846 8270C	Phenanthrene
SCM	SW-846 8270C	Pyrene
SCM	SW-846 8270C	Acenaphthene
SCM	SW-846 8270C	Acenaphthylene
SCM	SW-846 8270C	Anthracene
SCM	SW-846 8270C	Benzo(g,h,i)perylene
SCM	SW-846 8270C	Chrysene
SCM	SW-846 8270C	Methylnaphthalene (1-)
SCM	SW-846 8270C	Methylnaphthalene (2-)
SCM	SW-846 8270C	Naphthalene
SCM	SW-846 8270C	Fluoranthene
SCM	SW-846 8270C	Fluorene
SCM	SW-846 8270C	Methylnaphthalene (1-)
SCM	SW-846 8270C	Nitrodiphenylamine (2-)
SCM	SW-846 8270C	Nitrodiphenylamine (2-)

Matrix	Method	Parameter
SCM	SW-846 8270C	Hexachlorophene
SCM	SW-846 8270C	Diphenylhydrazine (1,2-)
SCM	SW-846 8270C	Decane (n-)
SCM	SW-846 8270C	Octadecane (n-)
SCM	SW-846 8270C	Benzo(a)anthracene
SCM	SW-846 8270C	Benzo(a)pyrene
SCM	SW-846 8270C	Benzo(b)fluoranthene
SCM	SW-846 8270C	Benzo(k)fluoranthene
SCM	SW-846 8270C	Dibenzo(a,h)anthracene
SCM	SW-846 8270C	Indeno(1,2,3-c,d)pyrene
SCM	SW-846 8270C	Benzal chloride
SCM	SW-846 8270C	Benzo(j)fluoranthene
SCM	SW-846 8270C	Benzotrichloride
SCM	SW-846 8270C	Benzyl chloride
SCM	SW-846 8270C	Chlorobenzilate
SCM	SW-846 8270C	Dibenz(a,h)acridine
SCM	SW-846 8270C	Dibenzo(a,h)pyrene
SCM	SW-846 8270C	Dibenzo(a,i)pyrene
SCM	SW-846 8270C	Dibenzo(c,g)carbazole (7H-)
SCM	SW-846 8270C	Pentachloroethane
SCM	SW-846 8270C	Tetrachlorobenzene (1,2,3,4-)
SCM	SW-846 8270C	Tetrachlorobenzene (1,2,3,5-)
SCM	SW-846 8270C	Benzyl alcohol
SCM	SW-846 8270C	Acetophenone
SCM	SW-846 8270C	Acetylaminofluorene (2-)
SCM	SW-846 8270C	Aminobiphenyl (4-)
SCM	SW-846 8270C	Aramite
SCM	SW-846 8270C	Chloronaphthalene (1-)
SCM	SW-846 8270C	Diallate (cis)
SCM	SW-846 8270C	Diallate (trans)
SCM	SW-846 8270C	Dibenzo(a,e)pyrene
SCM	SW-846 8270C	Dibenz(a,j)acridine
SCM	SW-846 8270C	Dichlorophenol (2,6-)
SCM	SW-846 8270C	Dimethoate
SCM	SW-846 8270C	Dimethylaminoazobenzene
SCM	SW-846 8270C	Dimethylbenz(a)anthracene (7,12-)
SCM	SW-846 8270C	Dimethyl benzidine (3,3-)
SCM	SW-846 8270C	Dinitrobenzene (1,3-)
SCM	SW-846 8270C	Dinoseb
SCM	SW-846 8270C	Disulfoton

Matrix	Method	Parameter
SCM	SW-846 8270C	Famphur
SCM	SW-846 8270C	Hexachloropropene
SCM	SW-846 8270C	Isodrin
SCM	SW-846 8270C	Isosafrole (cis-)
SCM	SW-846 8270C	Isosafrole (trans-)
SCM	SW-846 8270C	Kepone
SCM	SW-846 8270C	Methanesulfonate (Ethyl-)
SCM	SW-846 8270C	Methanesulfonate (Methyl-)
SCM	SW-846 8270C	Methapyrilene
SCM	SW-846 8270C	Methylcholanthrene (3-)
SCM	SW-846 8270C	Napthoquinone (1,4-)
SCM	SW-846 8270C	Napththylamine (1-)
SCM	SW-846 8270C	Napththylamine (2-)
SCM	SW-846 8270C	N-Nitroso-di-n-butylamine
SCM	SW-846 8270C	N-Nitrosomorpholine
SCM	SW-846 8270C	N-Nitrosopiperidine
SCM	SW-846 8270C	Parathion
SCM	SW-846 8270C	Parathion methyl
SCM	SW-846 8270C	Pentachlorobenzene
SCM	SW-846 8270C	Pentachloronitrobenzene
SCM	SW-846 8270C	Phenacetin
SCM	SW-846 8270C	Phenylenediamine (1,4-)
SCM	SW-846 8270C	Phenylethylamine (alpha, alpha-Dimethyl)
SCM	SW-846 8270C	Phorate
SCM	SW-846 8270C	Phosphorothioate (O,O,O-triethyl)
SCM	SW-846 8270C	Phosphorothioate (O,O-diethyl-O-2-pyrazinyl) [Thionazin]
SCM	SW-846 8270C	Picoline (2-)
SCM	SW-846 8270C	Pronamide
SCM	SW-846 8270C	Quinoline -1-Oxide (4-Nitro)
SCM	SW-846 8270C	Safrole
SCM	SW-846 8270C	Sulfotepp
SCM	SW-846 8270C	Tetrachlorobenzene (1,2,4,5-)
SCM	SW-846 8270C	Tetrachlorophenol (2,3,4,6-)
SCM	SW-846 8270C	Toluidine (2-) (2-Methylaniline)
SCM	SW-846 8270C	Toluidine (5-nitro-2-)
SCM	SW-846 8270C	Trinitrobenzene (1,3,5-)
SCM	SW-846 8270C	N-Nitrosodiethylamine
SCM	SW-846 8270C	N-Nitrosopyrrolidine
SCM	SW-846 8270C	Diphenylamine

Matrix	Method	Parameter
SCM	SW-846 8270C	Carbazole
SCM	SW-846 8270C	Dichlorobenzene (1,2-)
SCM	SW-846 8270C	Dichlorobenzene (1,3-)
SCM	SW-846 8270C	N-Nitrosodimethylamine
SCM	SW-846 8270C	N-Nitroso-di-n-propylamine
SCM	SW-846 8270C	N-Nitrosomethylethylamine
SCM	SW-846 8270C	Benzidine
SCM	SW-846 8270C	Aniline
SCM	SW-846 8270C	Hexachloropropene
SCM	SW-846 8270C	Dibenzofuran
SCM	SW-846 8270C	Benzoic acid
SCM	SW-846 8270C	N-Nitrosodiphenylamine
SCM	SW-846 8270C	Dichlorobenzidine (3,3'-)
SCM	SW-846 8270C	Chloroaniline (4-)
SCM	SW-846 8270C	Nitroaniline (2-)
SCM	SW-846 8270C	Nitroaniline (3-)
SCM	SW-846 8270C	Nitroaniline (4-)
SCM	SW-846 8270C	Chloronaphthalene (2-)
SCM	SW-846 8270C	Hexachlorobenzene
SCM	SW-846 8270C	Hexachlorobutadiene (1,3-)
SCM	SW-846 8270C	Hexachlorocyclopentadiene
SCM	SW-846 8270C	Hexachloroethane
SCM	SW-846 8270C	Trichlorobenzene (1,2,4-)
SCM	SW-846 8270C	Bis (2-chloroethoxy) methane
SCM	SW-846 8270C	Bis (2-chloroethyl) ether
SCM	SW-846 8270C	Bis (2-chloroisopropyl) ether
SCM	SW-846 8270C	Chlorophenyl-phenyl ether (4-)
SCM	SW-846 8270C	Bromophenyl-phenyl ether (4-)
SCM	SW-846 8270C	Dinitrotoluene (2,4-)
SCM	SW-846 8270C	Dinitrotoluene (2,6-)
SCM	SW-846 8270C	Isophorone
SCM	SW-846 8270C	Nitrobenzene
SCM	SW-846 8270C	Butyl benzyl phthalate
SCM	SW-846 8270C	Bis (2-ethylhexyl) phthalate
SCM	SW-846 8270C	Diethyl phthalate
SCM	SW-846 8270C	Dimethyl phthalate
SCM	SW-846 8270C	Di-n-butyl phthalate
SCM	SW-846 8270C	Di-n-octyl phthalate
SCM	SW-846 8270C	Acenaphthene
SCM	SW-846 8270C	Anthracene

Matrix	Method	Parameter
SCM	SW-846 8270C	Acenaphthylene
SCM	SW-846 8270C	Benzo(a)anthracene
SCM	SW-846 8270C	Benzo(a)pyrene
SCM	SW-846 8270C	Benzo(b)fluoranthene
SCM	SW-846 8270C	Benzo(g,h,i)perylene
SCM	SW-846 8270C	Benzo(k)fluoranthene
SCM	SW-846 8270C	Chrysene
SCM	SW-846 8270C	Dibenzo(a,h)anthracene
SCM	SW-846 8270C	Fluoranthene
SCM	SW-846 8270C	Fluorene
SCM	SW-846 8270C	Indeno(1,2,3-c,d)pyrene
SCM	SW-846 8270C	Methylnaphthalene (2-)
SCM	SW-846 8270C	Naphthalene
SCM	SW-846 8270C	Phenanthrene
SCM	SW-846 8270C	Pyrene
SCM	SW-846 8270C	Methyl phenol (4-chloro-3-)
SCM	SW-846 8270C	Chlorophenol (2-)
SCM	SW-846 8270C	Dichlorophenol (2,4-)
SCM	SW-846 8270C	Dimethylphenol (2,4-)
SCM	SW-846 8270C	Dinitrophenol (2,4-)
SCM	SW-846 8270C	Dinitrophenol (2-methyl-4,6-)
SCM	SW-846 8270C	Methylphenol (2-)
SCM	SW-846 8270C	Methylphenol (4-)
SCM	SW-846 8270C	Nitrophenol (2-)
SCM	SW-846 8270C	Nitrophenol (4-)
SCM	SW-846 8270C	Pentachlorophenol
SCM	SW-846 8270C	Phenol
SCM	SW-846 8270C	Trichlorophenol (2,4,5-)
SCM	SW-846 8270C	Trichlorophenol (2,4,6-)
SCM	SW-846 8270C	Dichlorobenzene (1,4-)
SCM	SW-846 8270C	Pyridine
SCM	SW-846 8270D	Biphenyl (1,1'-)
SCM	SW-846 8270D	Benzaldehyde
SCM	SW-846 8270D	Caprolactam
SCM	SW-846 8270D	Atrazine
SCM	SW-846 8270D	Phenanthrene
SCM	SW-846 8270D	Pyrene
SCM	SW-846 8270D	Acenaphthene
SCM	SW-846 8270D	Acenaphthylene
SCM	SW-846 8270D	Anthracene

Matrix	Method	Parameter
SCM	SW-846 8270D	Benzo(g,h,i)perylene
SCM	SW-846 8270D	Chrysene
SCM	SW-846 8270D	Methylnaphthalene (1-)
SCM	SW-846 8270D	Methylnaphthalene (2-)
SCM	SW-846 8270D	Naphthalene
SCM	SW-846 8270D	Fluoranthene
SCM	SW-846 8270D	Fluorene
SCM	SW-846 8270D	Methylnaphthalene (1-)
SCM	SW-846 8270D	Nitrodiphenylamine (2-)
SCM	SW-846 8270D	Hexachlorophene
SCM	SW-846 8270D	Diphenylhydrazine (1,2-)
SCM	SW-846 8270D	Decane (n-)
SCM	SW-846 8270D	Octadecane (n-)
SCM	SW-846 8270D	Benzo(a)anthracene
SCM	SW-846 8270D	Benzo(a)pyrene
SCM	SW-846 8270D	Benzo(b)fluoranthene
SCM	SW-846 8270D	Benzo(k)fluoranthene
SCM	SW-846 8270D	Dibenzo(a,h)anthracene
SCM	SW-846 8270D	Indeno(1,2,3-c,d)pyrene
SCM	SW-846 8270D	Benzal chloride
SCM	SW-846 8270D	Benzo(j)fluoranthene
SCM	SW-846 8270D	Benzotrichloride
SCM	SW-846 8270D	Benzyl chloride
SCM	SW-846 8270D	Chlorobenzilate
SCM	SW-846 8270D	Dibenz(a,h)acridine
SCM	SW-846 8270D	Dibenzo(a,h)pyrene
SCM	SW-846 8270D	Dibenzo(a,i)pyrene
SCM	SW-846 8270D	Dibenzo(c,g)carbazole (7H-)
SCM	SW-846 8270D	Pentachloroethane
SCM	SW-846 8270D	Tetrachlorobenzene (1,2,3,4-)
SCM	SW-846 8270D	Tetrachlorobenzene (1,2,3,5-)
SCM	SW-846 8270D	Benzyl alcohol
SCM	SW-846 8270D	Acetophenone
SCM	SW-846 8270D	Acetylaminofluorene (2-)
SCM	SW-846 8270D	Aminobiphenyl (4-)
SCM	SW-846 8270D	Aramite
SCM	SW-846 8270D	Chloronaphthalene (1-)
SCM	SW-846 8270D	Diallate (cis)
SCM	SW-846 8270D	Diallate (trans)
SCM	SW-846 8270D	Dibenzo(a,e)pyrene

Matrix	Method	Parameter
SCM	SW-846 8270D	Dibenz(a,j)acridine
SCM	SW-846 8270D	Dichlorophenol (2,6-)
SCM	SW-846 8270D	Dimethoate
SCM	SW-846 8270D	Dimethylaminoazobenzene
SCM	SW-846 8270D	Dimethylbenz(a)anthracene (7,12-)
SCM	SW-846 8270D	Dimethyl benzidine (3,3-)
SCM	SW-846 8270D	Dinitrobenzene (1,3-)
SCM	SW-846 8270D	Dinoseb
SCM	SW-846 8270D	Disulfoton
SCM	SW-846 8270D	Famphur
SCM	SW-846 8270D	Isodrin
SCM	SW-846 8270D	Isosafrole (cis-)
SCM	SW-846 8270D	Isosafrole (trans-)
SCM	SW-846 8270D	Kepone
SCM	SW-846 8270D	Methanesulfonate (Ethyl-)
SCM	SW-846 8270D	Methanesulfonate (Methyl-)
SCM	SW-846 8270D	Methapyrilene
SCM	SW-846 8270D	Methylcholanthrene (3-)
SCM	SW-846 8270D	Napthoquinone (1,4-)
SCM	SW-846 8270D	Napththylamine (1-)
SCM	SW-846 8270D	Napththylamine (2-)
SCM	SW-846 8270D	N-Nitroso-di-n-butylamine
SCM	SW-846 8270D	N-Nitrosomorpholine
SCM	SW-846 8270D	N-Nitrosopiperidine
SCM	SW-846 8270D	Parathion
SCM	SW-846 8270D	Parathion methyl
SCM	SW-846 8270D	Pentachlorobenzene
SCM	SW-846 8270D	Pentachloronitrobenzene
SCM	SW-846 8270D	Phenacetin
SCM	SW-846 8270D	Phenylenediamine (1,4-)
SCM	SW-846 8270D	Phenylethylamine (alpha, alpha-Dimethyl)
SCM	SW-846 8270D	Phorate
SCM	SW-846 8270D	Phosphorothioate (O,O,O-triethyl)
SCM	SW-846 8270D	Phosphorothioate (O,O-diethyl-O-2-pyrazinyl) [Thionazin]
SCM	SW-846 8270D	Picoline (2-)
SCM	SW-846 8270D	Pronamide
SCM	SW-846 8270D	Quinoline -1-Oxide (4-Nitro)
SCM	SW-846 8270D	Safrole
SCM	SW-846 8270D	Sulfotepp

Matrix	Method	Parameter
SCM	SW-846 8270D	Tetrachlorobenzene (1,2,4,5-)
SCM	SW-846 8270D	Tetrachlorophenol (2,3,4,6-)
SCM	SW-846 8270D	Toluidine (2-) (2-Methylaniline)
SCM	SW-846 8270D	Toluidine (5-nitro-2-)
SCM	SW-846 8270D	Trinitrobenzene (1,3,5-)
SCM	SW-846 8270D	N-Nitrosodiethylamine
SCM	SW-846 8270D	N-Nitrosopyrrolidine
SCM	SW-846 8270D	Diphenylamine
SCM	SW-846 8270D	Carbazole
SCM	SW-846 8270D	Dichlorobenzene (1,2-)
SCM	SW-846 8270D	Dichlorobenzene (1,3-)
SCM	SW-846 8270D	N-Nitrosodimethylamine
SCM	SW-846 8270D	N-Nitroso-di-n-propylamine
SCM	SW-846 8270D	N-Nitrosomethylethylamine
SCM	SW-846 8270D	Benzidine
SCM	SW-846 8270D	Aniline
SCM	SW-846 8270D	Hexachloropropene
SCM	SW-846 8270D	Dibenzofuran
SCM	SW-846 8270D	Benzoic acid
SCM	SW-846 8270D	N-Nitrosodiphenylamine
SCM	SW-846 8270D	Dichlorobenzidine (3,3'-)
SCM	SW-846 8270D	Chloroaniline (4-)
SCM	SW-846 8270D	Nitroaniline (2-)
SCM	SW-846 8270D	Nitroaniline (3-)
SCM	SW-846 8270D	Nitroaniline (4-)
SCM	SW-846 8270D	Chloronaphthalene (2-)
SCM	SW-846 8270D	Hexachlorobenzene
SCM	SW-846 8270D	Hexachlorobutadiene (1,3-)
SCM	SW-846 8270D	Hexachlorocyclopentadiene
SCM	SW-846 8270D	Hexachloroethane
SCM	SW-846 8270D	Trichlorobenzene (1,2,4-)
SCM	SW-846 8270D	Bis (2-chloroethoxy) methane
SCM	SW-846 8270D	Bis (2-chloroethyl) ether
SCM	SW-846 8270D	Bis (2-chloroisopropyl) ether
SCM	SW-846 8270D	Chlorophenyl-phenyl ether (4-)
SCM	SW-846 8270D	Bromophenyl-phenyl ether (4-)
SCM	SW-846 8270D	Dinitrotoluene (2,4-)
SCM	SW-846 8270D	Dinitrotoluene (2,6-)
SCM	SW-846 8270D	Isophorone
SCM	SW-846 8270D	Nitrobenzene

Matrix	Method	Parameter
SCM	SW-846 8270D	Butyl benzyl phthalate
SCM	SW-846 8270D	Bis (2-ethylhexyl) phthalate
SCM	SW-846 8270D	Diethyl phthalate
SCM	SW-846 8270D	Dimethyl phthalate
SCM	SW-846 8270D	Di-n-butyl phthalate
SCM	SW-846 8270D	Di-n-octyl phthalate
SCM	SW-846 8270D	Acenaphthene
SCM	SW-846 8270D	Anthracene
SCM	SW-846 8270D	Acenaphthylene
SCM	SW-846 8270D	Benzo(a)anthracene
SCM	SW-846 8270D	Benzo(a)pyrene
SCM	SW-846 8270D	Benzo(b)fluoranthene
SCM	SW-846 8270D	Benzo(g,h,i)perylene
SCM	SW-846 8270D	Benzo(k)fluoranthene
SCM	SW-846 8270D	Chrysene
SCM	SW-846 8270D	Dibenzo(a,h)anthracene
SCM	SW-846 8270D	Fluoranthene
SCM	SW-846 8270D	Fluorene
SCM	SW-846 8270D	Indeno(1,2,3-c,d)pyrene
SCM	SW-846 8270D	Methylnaphthalene (2-)
SCM	SW-846 8270D	Naphthalene
SCM	SW-846 8270D	Phenanthrene
SCM	SW-846 8270D	Pyrene
SCM	SW-846 8270D	Methyl phenol (4-chloro-3-)
SCM	SW-846 8270D	Chlorophenol (2-)
SCM	SW-846 8270D	Dichlorophenol (2,4-)
SCM	SW-846 8270D	Dimethylphenol (2,4-)
SCM	SW-846 8270D	Dinitrophenol (2,4-)
SCM	SW-846 8270D	Dinitrophenol (2-methyl-4,6-)
SCM	SW-846 8270D	Methylphenol (2-)
SCM	SW-846 8270D	Methylphenol (4-)
SCM	SW-846 8270D	Nitrophenol (2-)
SCM	SW-846 8270D	Nitrophenol (4-)
SCM	SW-846 8270D	Pentachlorophenol
SCM	SW-846 8270D	Phenol
SCM	SW-846 8270D	Trichlorophenol (2,4,5-)
SCM	SW-846 8270D	Trichlorophenol (2,4,6-)
SCM	SW-846 8270D	Dichlorobenzene (1,4-)
SCM	SW-846 8270D	Pyridine
SCM	SW-846 8310	Acenaphthene

Matrix	Method	Parameter
SCM	SW-846 8310	Acenaphthylene
SCM	SW-846 8310	Anthracene
SCM	SW-846 8310	Benzo(a)anthracene
SCM	SW-846 8310	Benzo(a)pyrene
SCM	SW-846 8310	Benzo(b)fluoranthene
SCM	SW-846 8310	Benzo(g,h,i)perylene
SCM	SW-846 8310	Benzo(k)fluoranthene
SCM	SW-846 8310	Chrysene
SCM	SW-846 8310	Dibenzo(a,h)anthracene
SCM	SW-846 8310	Fluoranthene
SCM	SW-846 8310	Fluorene
SCM	SW-846 8310	Indeno(1,2,3-c,d)pyrene
SCM	SW-846 8310	Naphthalene
SCM	SW-846 8310	Phenanthrene
SCM	SW-846 8310	Pyrene
SCM	SW-846 8330	Nitroglycerine
SCM	SW-846 8330	Guanidine nitrate
SCM	SW-846 8330	PETN
SCM	SW-846 8330	HMX
SCM	SW-846 8330	RDX
SCM	SW-846 8330	Trinitrobenzene (1,3,5-)
SCM	SW-846 8330	Dinitrobenzene (1,3-)
SCM	SW-846 8330	Tetryl
SCM	SW-846 8330	Nitrobenzene
SCM	SW-846 8330	Trinitrotoluene (2,4,6-)
SCM	SW-846 8330	Dinitrotoluene (4-amino-2,6-)
SCM	SW-846 8330	Dinitrotoluene (2-amino-4,6-)
SCM	SW-846 8330	Dinitrotoluene (2,4-)
SCM	SW-846 8330	Dinitrotoluene (2,6-)
SCM	SW-846 8330	Nitrotoluene (2-)
SCM	SW-846 8330	Nitrotoluene (3-)
SCM	SW-846 8330	Nitrotoluene (4-)
SCM	SW-846 8330A	Nitroglycerine
SCM	SW-846 8330A	PETN
SCM	SW-846 8330A	HMX
SCM	SW-846 8330A	RDX
SCM	SW-846 8330A	Trinitrobenzene (1,3,5-)
SCM	SW-846 8330A	Dinitrobenzene (1,3-)
SCM	SW-846 8330A	Tetryl
SCM	SW-846 8330A	Nitrobenzene

Matrix	Method	Parameter
SCM	SW-846 8330A	Trinitrotoluene (2,4,6-)
SCM	SW-846 8330A	Dinitrotoluene (4-amino-2,6-)
SCM	SW-846 8330A	Dinitrotoluene (2-amino-4,6-)
SCM	SW-846 8330A	Dinitrotoluene (2,4-)
SCM	SW-846 8330A	Dinitrotoluene (2,6-)
SCM	SW-846 8330A	Nitrotoluene (2-)
SCM	SW-846 8330A	Nitrotoluene (3-)
SCM	SW-846 8330A	Nitrotoluene (4-)
SCM	SW-846 8440	Total rec. petroleum hydrocarbons
SCM	SW-846 9010C	Cyanide - amenable to Cl2
SCM	SW-846 9010C	Cyanide
SCM	SW-846 9012B	Cyanide
SCM	SW-846 9013	Cyanide
SCM	SW-846 9023	Extractable organic halides (EOX)
SCM	SW-846 9030B	Sulfides, acid sol. & insol.
SCM	SW-846 9034	Sulfides, acid sol. & insol.
SCM	SW-846 9040B	Corrosivity - pH waste, >20% water
SCM	SW-846 9040C	Corrosivity - pH waste, >20% water
SCM	SW-846 9045C	pH - soil and waste
SCM	SW-846 9045D	pH - soil and waste
SCM	SW-846 9056	Bromide
SCM	SW-846 9056	Nitrite
SCM	SW-846 9056	Sulfate
SCM	SW-846 9056	Nitrate
SCM	SW-846 9056	Chloride
SCM	SW-846 9056	Fluoride
SCM	SW-846 9056	Orthophosphate
SCM	SW-846 9056A	Bromide
SCM	SW-846 9056A	Nitrite
SCM	SW-846 9056A	Sulfate
SCM	SW-846 9056A	Nitrate
SCM	SW-846 9056A	Chloride
SCM	SW-846 9056A	Fluoride
SCM	SW-846 9056A	Orthophosphate
SCM	SW-846 9060	Total organic carbon (TOC)
SCM	SW-846 9060A	Total organic carbon (TOC)
SCM	SW-846 9071B	Oil & grease - sludge-hem-npm
SCM	SW-846 9071B	Oil & grease - sludge-hem
SCM	SW-846 9095	Free liquid
SCM	SW-846 9095B	Free liquid

Matrix	Method	Parameter
SCM	User Defined 8260C	Hexane (n-)
SCM	User Defined 9010B	Cyanide - amenable to Cl2
SCM	User Defined 9010B	Cyanide
SCM	User Defined 9012A	Cyanide
SCM	User Defined 9013A	Cyanide
SCM	User Defined 9095A	Free liquid
SCM	User Defined ASTM D93	Ignitability
SCM	User Defined CA LUFT - diesel	Petroleum Organics
SCM	User Defined CA LUFT - diesel	Petroleum Organics
SCM	User Defined LUFT	Xylene (m-)
SCM	User Defined LUFT	Xylene (o-)
SCM	User Defined LUFT	Xylene (p-)
SCM	User Defined LUFT	Benzene
SCM	User Defined LUFT	Ethylbenzene
SCM	User Defined LUFT	Toluene
SCM	User Defined LUFT	Xylenes (total)
SCM	User Defined LUFT	Methyl tert-butyl ether
SCM	User Defined MA-DEP-EPH, TN-EPH, WI DRO, NW TPH Dx	Diesel range organic
SCM	User Defined MA-DEP-VPH, WI GRO, NW TPH Gx	Gasoline range organic
SCM	User Defined NWTPH-Dx, NWTPH-Gx, NWTPHID	Petroleum Organics
SCM	User Defined SW846 8260B & 8260C	Gasoline range organic
SCM	User Defined SW-846 8330	Nitroguanidine
SCM	User Defined TX 1005, TX 1006, CT ETPH, NW TPH ID	Petroleum Organics

3.4 ABBREVIATIONS/ACRONYMS

The quality department is responsible for setting up and maintaining a list of abbreviations used in the quality manual.

ABBREVIATION	***DESCRIPTION***
A2LA	*AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION*
AIHA	*AMERICAN INDUSTRIAL HYGIENE ASSOCIATION*
AIHA-LAP	*AIHA's LABORATORY ACCREDITATION PROGRAM*
AIHA-PAT	*AIHA's PROFICIENCY ANALYICAL TESTING PROGRAM*
BLANK	*See FIELD, TRIP, METHOD, EQUIPMENT, INSTRUMENT, REAGENT*
CAL	*CALIBRATION*
CCB	*CONTINUING CALIBRATION BLANK*
CCV	*CONTINUING CALIBRATION VERIFICATION*
CDOC	*CONTINUING DEMONSTRATION OF CAPABILITY*
COC	*CHAIN OF CUSTODY*
CA	*CORRECTIVE ACTION*
CRM	*CERTIFIED REFERENCE MATERIAL*
DQO	*DATA QUALITY OBJECTIVES*
DUP	*DUPLICATE*
EB	*EQUIPMENT BLANK*
FB	*FIELD BLANK*
GC	*GAS CHROMATOGRAPHY*
GCMS	*GAS CHROMATOGRAPHY MASS SPECTROMETRY*
HPLC	*HIGH PRESSURE LIQUID CHROMATOGRAPHY*
IB	*INSTRUMENT BLANK*
IC	*ION CHROMATOGRAPHY*
ICP	*INDUCTIVELY COUPLED PLASMA*
ICPMS	*INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY*
ICS	*INTERFERENCE CHECK SAMPLE*
ICV – See SSCV	*INITIAL CALIBRATION VERIFICATION*
IDOC	*INITIAL DEMONSTRATION OF CAPABILITY (SEE ALSO CDOC)*
IDL	*INSTRUMENT DETECTION LIMIT*
ISTD	*INTERNAL STANDARD*
LCS	*LABORATORY CONTROL SAMPLE (Typically 2ND Source)*
LCSD	*LABORATORY CONTROL SAMPLE DUPLICATE*
LOD	*LIMIT OF DETECTION*
LOQ	*LIMIT OF QUANTITATION*
LDR	*LINEAR DYNAMIC RANGE*
MAT	*MATRIX*
MS	*MATRIX SPIKE*
MSD	*MATRIX SPIKE DUPLICATE*

ABBREVIATION	***DESCRIPTION***
MDL	*METHOD DETECTION LIMIT*
MB	*METHOD BLANK*
NC	*NEGATIVE CONTROL*
% Rec	*PERCENT RECOVERY*
PC	*POSITIVE CONTROL*
PDL	*PRACTICAL DETECTION LIMIT*
PQL	*PRACTICAL QUANTITATION LIMIT also See Reporting Limit (RL)*
PT	*PROFICIENCY TEST SAMPLE*
QUAL	*QUALIFIER*
QA	*QUALITY ASSURANCE*
QAM	*QUALITY ASSURANCE MANUAL*
QAO	*QUALITY ASSURANCE OFFICER*
QC	*QUALITY CONTROL*
RF	*RESPONSE FACTOR*
RB	*REAGENT BLANK*
RL	*REPORTING LIMIT*
RLV	*REPORTING LIMIT VERIFICATION*
RPD	*RELATIVE PERCENT DIFFERENCE*
RSD	*RELATIVE STANDARD DEVIATION*
SSCV	*SECONDARY SOURCE CALIBRATION VERIFICAION*
SOP	*STANDARD OPERATING PROCEDURE*
SRM	*STANDARD REFERENCE MATERIAL*
SURR	*SURROGATE*
SVOC	*SEMI-VOLATILE ORGANIC COMPOUND*
TNI	*THE NELAC INSTITUTE*
UV	*ULTRAVIOLET*
VOC	*VOLATILE ORGANIC COMPOUND*

4.0 MANAGEMENT REQUIREMENTS

4.1 ORGANIZATION

4.1.1 Legal identity

The laboratory is authorized under Title 62 of the Tennessee Code Annotated and is identified as Environmental Science Corporation (d.b.a. ESC Lab Sciences) located at 12065 Lebanon Road, Mount Juliet, TN 37122

4.1.2 Organization

The laboratory is a public entity and is structured to provide environmental support services in compliance with numerous federal, state, and local regulations as well as to meet the analytical needs of the customer.

4.1.3 Facilities Under Management System

The scope of the ESC management system is comprehensive and covers all technical and supporting work conducted at all facilities including the primary Lebanon Road location as well as customer support and shipping operations across the US.

4.1.4 Independence

ESC Lab Sciences is an independent analytical facility, and is not a part of another organization.

4.1.5 Laboratory Managerial Polices

ESC Lab Sciences must have the following:

- Managerial and technical personnel have the authority and resources needed to carry out their duties. Management bears the specific responsibility for the implementation, maintenance, and improvement of the laboratory's management system. This includes the identification of any departures from the management system or standard operating procedures, and to initiate actions to prevent or minimize such departures.
- Management and personnel that are free from any undue pressures and influences that may adversely affect the quality of their work. The organizational structure indicated in this section is designed to minimize the potential for conflicts or undue stresses that might influence the technical judgment of analytical personnel. Analytical personnel are generally isolated from customer contact as much as practical. In addition, the laboratory workload is continually reviewed and managed in such a way as to reduce the potential for undue production pressure on analytical personnel.

- Policies and procedures to ensure the protection of its customers' confidentiality. The laboratory's confidentiality policy is to not divulge or release any information to a third party without proper written authorization. All information pertaining to a particular customer will remain confidential. Data will be released to outside agencies only with written authorization from the customer or where federal or state law requires the laboratory to do so. Samples are generally identified with laboratory identification numbers, and access to electronic records and reports is password protected. Confidentiality statements are applied to fax and e-mail communications. All personnel, including contract and temporary, are required to sign an "Attestation of Ethics and Confidentiality" at the time of employment and during annual refresher training. Violations of this document result in serious consequences, including prosecution and termination, if necessary. For more information see the ESC Policy Manual and SOP #010102, *Ethics, Data Integrity, and Confidentiality*.
- Policies and procedures to avoid involvement in any activities that would diminish confidence in its competence, impartiality, judgment or operational integrity. For more information see the ESC Policy Manual and SOP #010102, Ethics, Data Integrity, and Confidentiality. The laboratory's data integrity system is also discussed in Section 4.2.8 below.
- A defined organization and management structure. The laboratory's organizational chart can be found at the end of this section.
- Specifications of the responsibility, authority, and interrelationships of all personnel who manage, perform, or verify work affecting the quality of the analytical results. Job descriptions are documented and maintained by the Human Resources department. It is the laboratory's policy that each individual understands his or her particular responsibilities and how to report problems when they occur.
- Adequate supervision provided to all analytical staff, including trainees, by persons familiar with the analytical methods and procedures.
- Technical management which has overall responsibility for the technical operations. This includes providing the resources needed to ensure the required quality of laboratory operations is met as per the policies and procedures documented in this Quality Assurance Manual. This technical management includes the Chief Executive Officer, the President, the Director of Operations, the Organics Manager, the Inorganics Manager, and each individual department supervisor.
- Quality management which has the responsibility and authority for ensuring that the management system related to quality is implemented and followed at all times. Currently the Compliance Director and the Quality Assurance Director have been appointed for this task. These staff members have direct

access to the highest level of management at which decisions are made on laboratory policy and resources.

- Appointed deputies for key managerial personnel. The following table defines who assumes the responsibilities of key personnel in their absence:

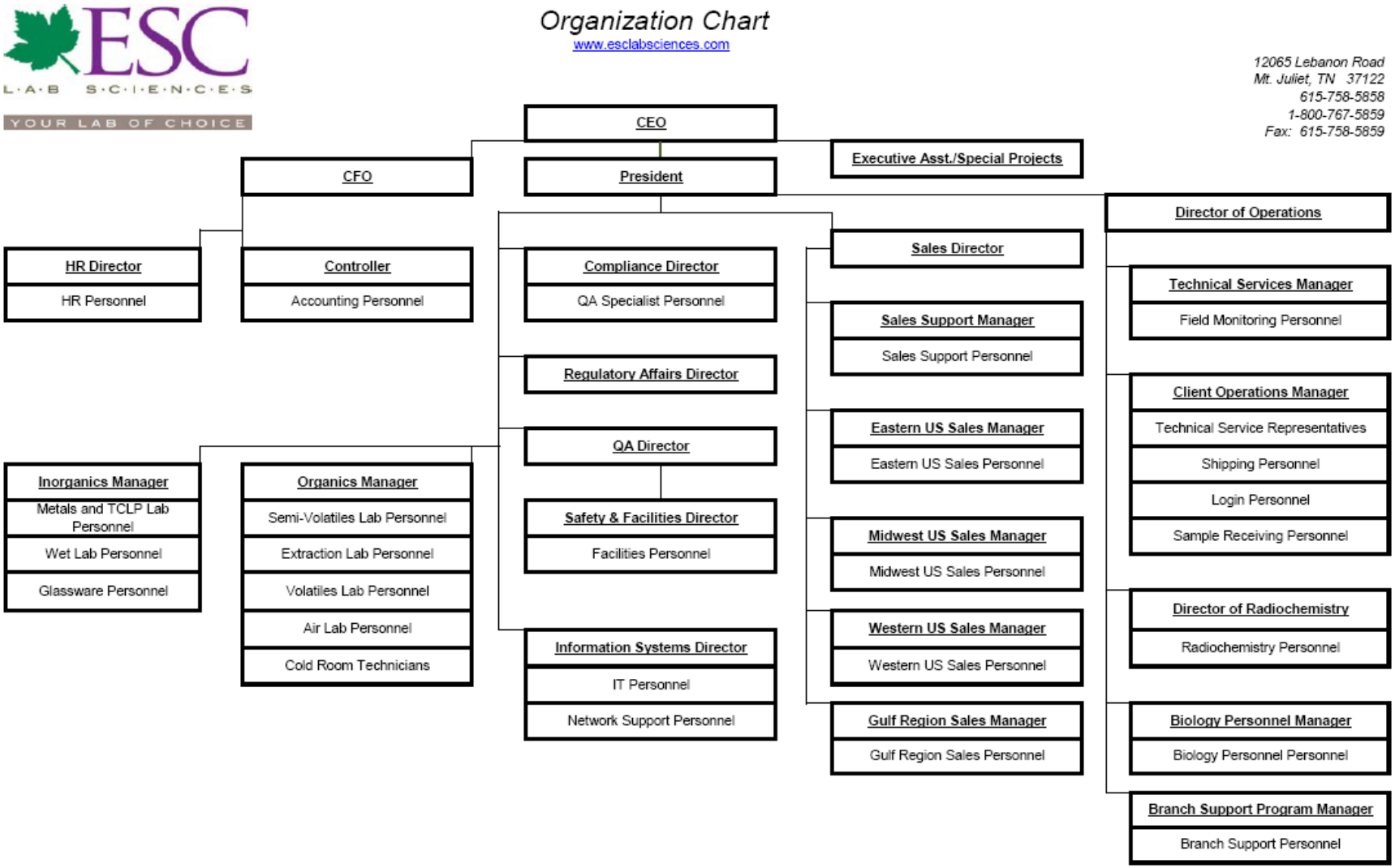
PRIMARY	DEPUTY
Chief Executive Officer	President
President	Chief Executive Officer
Director of Operations	Technical Services Manager
Organics Manager	President and Department Supervisors/Leads
Inorganics Manager	President and Department Supervisors/Leads
Compliance Director	Quality Assurance Director
Quality Assurance Director	Compliance Director
Information Systems Director	Ad Hoc (Applicable IT personnel as needed)

- Personnel that are aware of the relevance and importance of their activities and how they contribute to the achievement of the objectives of the management system. Laboratory management ensures that all personnel are aware that their job is needed, and how each role contributes to the laboratory's business goals. All personnel are required to familiarize themselves with the quality documentation relevant to their position and implement these policies and procedures in their work. All personnel must ensure that the generation and reporting of quality analytical data is a fundamental priority.

4.1.6 Laboratory Communication

Laboratory management ensures that appropriate communication processes are established within the laboratory and that communication takes place regarding the effectiveness of the management system. Laboratory personnel (including supervisors and managers) communicate as needed through meetings, memos, and/or e-mails.

Figure 4.1 Organizational Chart (*Subject to change*)



4.2 Management System

4.2.1 General

ESC Lab Sciences has established, implemented, and maintains a management system appropriate to the scope of its activities. ESC Lab Sciences has documented its policies and procedures to the extent necessary to assure the quality of the analytical test results. The ESC Lab Sciences management system's documentation is communicated to, understood by, available to, and implemented by the appropriate laboratory personnel.

4.2.2 Management's Quality Policy Statement

ESC Lab Sciences has a diverse accreditation/certification program which represents greater than 48 separate state and national accreditations. This requires commitment to the laboratory's quality system, and it also requires continuous improvement to comply with all the applicable state, federal, and industry standards. ISO 17025 is maintained as the minimum foundation to meet each program requirement.

ESC Lab Sciences management is committed to providing our customers reliable data of known quality that meets their requirements by following the quality system that is documented in this Quality Assurance Manual. Management is committed to using good professional practices and demonstrates its commitment to quality by providing the personnel, equipment, and facilities necessary to ensure the laboratory gives our customers the highest possible standard of service.

The primary responsibility for quality rests with each individual within ESC Lab Sciences. All personnel are required to familiarize themselves with the quality documentation relevant to their position and implement these policies and procedures in their work. All personnel must ensure that the generation and reporting of quality analytical data is a fundamental priority. This focus on quality is applied to initial project planning, continued through all field and laboratory activities, and is ultimately included in the final report generation.

4.2.3 Management's Commitment to the Management System

ESC's management is committed to the development, implementation, and continual improvement of the laboratory's management system. Evidence of this commitment can be found in the policies and procedures that are included in this Quality Assurance Manual which includes, but is not limited to, records of management review meetings as per section 4.15 below.

4.2.4 Communication of Customer and Regulatory Requirements

ESC's management communicates to the organization the importance of meeting

customer and regulatory requirements. This is accomplished in writing through this Quality Assurance Manual, ESC's Policy Manual, and through ESC's Standard Operating Procedures. This is also accomplished verbally through staff meetings.

4.2.5 Supporting and Technical Procedures

The full list of supporting and technical procedures used by the laboratory is maintained by the Quality Assurance Department. This list can be provided upon request. This Quality Assurance Manual contains references to these procedures where applicable, and outlines the structure of the documentation used in the laboratory's management system.

4.2.6 Management Roles and Responsibilities

The roles and responsibilities of some technical and quality management are defined below. More information can be found in the job descriptions that are maintained by the Human Resources department. All managers and supervisors are responsible to ensure that their respective departments comply with all the applicable state, federal, and industry standards.

Chief Executive Officer

Peter Schulert, Bachelor of Science in Chemistry, is the laboratory's Chief Executive Officer (CEO). He joined ESC in 1987 after the completion of his service with the United States Naval Submarine Service. In his five years of nuclear submarine experience in the Navy, Mr. Schulert qualified as an Officer of the Deck. This qualification included supervision of nuclear reactors and power plant operations. His vision for automation and customer services has been a key component of ESC's rise to the top ranks of the industry. Under his leadership, ESC has become a large single location laboratory, with a comprehensive national certification program and industry leading data management tools. In his absence, all responsibilities are delegated to the ESC President.

President

John Mitchell, Bachelor of Science in Chemistry, is the laboratory's President. He joined ESC in 2014 after gaining over 25 years of experience in commercial laboratory operations and management. He has served as a National Program Director for Oil and Gas Programs for several years, assisting exploration and production industrial customers with the establishment and management of risk-based analytical programs to ensure compliance with regulatory requirements and to develop additional strategies to reduce long term environmental impact liability. He directed emergency response actions, leading the laboratory response for multiple large scale mobilizations across the country. Mr. Mitchell is responsible for developing and executing ESC's strategic plan. In his absence, all operational responsibilities are delegated to the Chief Executive Officer.

Director of Operations

Eric Johnson, B.S. in Chemistry, is the laboratory's Director of Operations and is primarily responsible for the Project Management, Branch Support, Shipping, and Receiving departments. He has been involved in many aspects of environmental analyses since 1991, and has vast experience in managing the daily laboratory and customer service operations of ESC Lab Sciences. He focuses his background and experience on the improvement of existing systems in order to improve quality and maximize efficiency. He reports directly to the President. In his absence, his responsibilities are delegated to the Technical Services Manager and then to individual department managers.

Organics Manager

Chris Johnson, B.S. in Biology, is the Organics Manager. He has more than 15 years of laboratory experience which includes supervising laboratory personnel and also performing analyses for metals, volatile organic compounds, and semi-volatile organic compounds in support of the Safe Drinking Water Act, Clean Water Act, Resource Conservation and Recovery Act, and numerous other state and regulatory programs. His responsibilities are to share the vision and direction of laboratory management with the organic departments, effectively communicate with laboratory management and to personnel within the organic departments, to develop goals within the organic departments, to provide the information and resources necessary to reach each goal, and for ensuring the organic departments are providing accurate analytical data in the most efficient manner possible within regulatory guidelines. He is also responsible for the research, evaluation, implementation, and validation of new instrumentation and methodologies. In his absence, his responsibilities are delegated to the President then to individual department supervisors and/or leads.

Inorganics Manager

Johnny Davis, B.S. in Biology, is the Inorganics Manager. He has 13 years of laboratory experience which includes supervising laboratory personnel and also performing analyses for metals and semi-volatile organic compounds in support of the Safe Drinking Water Act, Clean Water Act, Resource Conservation and Recovery Act, and numerous other state and regulatory programs. His responsibilities are to share the vision and direction of laboratory management with the inorganic departments, effectively communicate with laboratory management and to personnel within the inorganic departments, to develop goals within the inorganic departments, to provide the information and resources necessary to reach each goal, and for ensuring the inorganic departments are providing accurate analytical data in the most efficient manner possible within regulatory guidelines. He is also responsible for the research, evaluation, implementation, and validation of new instrumentation and methodologies. In his absence, his responsibilities are delegated to the President then to individual department supervisors and/or leads.

Compliance Director

Jim Brownfield, B.S. in Chemistry, is the Compliance Director. His primary responsibility is to ensure regulatory compliance of the laboratory. He is also responsible for managing the implementation, monitoring, and development of the laboratory's Quality Assurance Systems; maintaining the laboratory's Quality Assurance Manual; and ensuring all laboratory personnel are strictly adhering to the laboratory's ethics policy. He also performs other Quality Assurance activities including method validation, technical writing, and participation in internal and external assessments. In addition, he oversees the QA data review team. He has more than 15 years of experience in various supervisory and managerial roles in the environmental laboratory industry. Over the years he has gained an extensive and detailed understanding of regulatory and accreditation requirements of federal and various state accreditation agencies. He has successfully designed, developed, implemented, and maintained Quality Assurance Systems in multiple laboratories. In his absence, all responsibilities are delegated to the Quality Assurance Director.

Quality Assurance Director

Steve Miller, B.S. in Microbiology, is the laboratory Quality Assurance Director and is responsible for managing the implementation, monitoring, and development of the laboratory's Quality Assurance Systems. In this role, he also oversees safety, waste management, internal and external audits, and new method implementation. He has been involved in many aspects of the environmental industry since 1990. He has an in-depth knowledge of GC and GCMS methods and instrumentation having hands-on experience with MS, PID/FID, FID, and ECD detectors. He has years of experience validating all types of environmental data. He has served as technical support for many environmental site investigation and/or remediation projects, primary author of several project-specific Quality Assurance Project Plans, support for RCRA-permitted activities at major oil refineries (including permit modification), and primary author of the first hazardous waste delisting petition approved by U.S. EPA Region 8. In his absence, all responsibilities are delegated to the Compliance Director.

Information Systems Director

Nick Parker, B.S. in Plant and Soil Science, is the laboratory's Information Systems Director. He has more than 15 years of laboratory experience in Organic analytical methods/instrumentation in the production laboratory environment and an expertise within information technologies and process automation. Mr. Parker is responsible for ESC's data management, information security, and software development while leading a team of developers, specialists, and Database Administrators. His unique understanding of laboratory operations and environmental methodology contributes to ESC's well managed software development and deployment within all laboratory

and quality departments. In his absence, all responsibilities are delegate to applicable personnel in the IT department.

4.2.7 Management of System Changes

Top management ensures that the integrity of the management system is maintained when changes to the management system are planned and implemented. This includes ensuring that quality system documentation is updated as needed.

4.2.8 Data Integrity System

ESC Lab Sciences is committed to ensuring the integrity of its data and providing valid data of known and documented quality to its customers. ESC is also committed to creating and maintaining a culture of quality throughout the organization. The elements in ESC's data integrity system include:

- A standardized data integrity training program that is given to all new employees and a yearly refresher course is also presented to all employees.
- All ESC personnel, including contract and temporary, are required to sign an "Attestation of Ethics and Confidentiality" at the time of employment and during annual refresher training.
- An in-depth periodic monitoring of data integrity which includes, but is not limited to, the following: peer data review, internal audits, QA data review of raw data, and proficiency testing studies.
- A process that allows for confidential reporting of alleged data integrity issues. Currently, an anonymous hotline is available to all employees that is managed by an outside vendor. Messages are collected, documented, reviewed, and will be followed up on by senior management to resolve the matter. Comments made on this hotline are confidential, and callers will remain anonymous.

Anonymous Hotline Number: 1-800-398-1496

Additional information about the laboratory's data integrity system can be found in SOP# 010102 *Ethics, Data Integrity, and Confidentiality*. This SOP is signed by top management and is reviewed at least annually.

4.2.9 Policy for Use and Control of Electronic Signatures

Electronic signatures must be controlled by the individual as electronic files. Electronic signature files must be stored in a secure password protected environment, and are not sent to or used by other individuals. Electronic signatures carry the same weight as handwritten signatures with regards to document approval.

4.3 DOCUMENT MANAGEMENT

This section describes procedures for document management, which includes controlling, distributing, reviewing, and accepting modifications. The purpose of document management is to ensure that adequate instruction is readily available for laboratory employees and to preclude the use of invalid and/or obsolete documents.

4.3.1 Document Control Procedure

ESC has an established procedure for managing documents that are part of the quality system. The list of managed documents includes, but is not limited to, Standard Operating Procedures (both technical and non-technical), the Quality Assurance Manual, policy statements, work-processing documents, charts, and forms that have a direct bearing on the quality system.

Documents required by the management system are managed per the SOP #010103, *Document Control and Distribution*.

4.3.2 Document Approval and Issue

Documents are reviewed and approved for use by authorized personnel prior to issue. A master list of all managed documents is maintained identifying the current revision status and distribution of the controlled documents. This establishes that there are no invalid or obsolete documents in use.

The SOP #010103, *Document Control and Distribution* ensures:

- Only currently approved document versions are available at points of use
- Documents are reviewed periodically and revised if necessary
- Invalid or obsolete documents are promptly removed from general use
- Obsolete documents retained for audit or knowledge preservation purposes are suitably marked and/or isolated to prevent accidental use

Documents that are generated internally by the laboratory are uniquely identified with the following:

- Date of issue and/or revision identification
- Page numbering
- Total number of pages or a mark to indicate the end of the document
- The issuing authority(ies)

4.3.3 Changes to Controlled Documents

Document changes are reviewed and approved by the original approving authority(ies) unless specifically designated otherwise. Designated authorities are required to have pertinent background information upon which to base their review and approval.

Where practicable, the altered text or new text in the draft is identified during the revision or review process to provide for easy identification of the modifications. Minor SOP changes that occur in the interim of each major revision of the procedure are indicated in the ESC SOP/Minor Revision Form that is attached to the SOP. All SOPs contain a revision history that provides details of changes during periodic reviews and/or major SOP revisions.

The document management process allows for “minor revisions” or amendments to SOPs where changes are not sufficient to cause a full procedure change. Minor revisions may take the form of handwritten or typed notes on an approved SOP Minor Revision form. Approval of these minor revisions are indicated by the initials of the approval authorities. The modified document is then distributed, and obsolete documents are removed. Minor revisions to documents are incorporated into the next full revision as soon as practical.

Electronic documents, such as the Quality Assurance Manual and SOPs, are maintained electronically on protected directories. All laboratory personnel have access to directories that contain the currently approved versions, but edit rights are restricted to authorized personnel only. Obsolete versions of electronic documents are maintained in directories that can only be accessed be authorized personnel.

4.3.4 Quality Assurance Manual

The Compliance Director is responsible for maintaining the currency of the Quality Assurance Manual.

The Quality Assurance Manual is reviewed/revised annually or whenever a change is deemed necessary by laboratory management to ensure it still reflects current practices and meets the requirements of any applicable regulations or customer specifications.

The Quality Assurance Manual contains the following required items as defined by the 2009 TNI Standard (V1:M2, Section 4.2.8.3):

- A document title
- The laboratory's full name and address
- The name, address (if different from above), and telephone number of individual(s) responsible for the laboratory;
- The identification of all major organizational units which are to be covered by this quality manual and the effective date of the version
- Identification of the laboratory's approved signatories;
- The signed and dated concurrence (with appropriate names and titles), of all responsible parties including the quality manager, technical manager(s), and the agent who is in charge of all laboratory activities, such as the laboratory director or laboratory manager.
- The objectives of the management system and contain or reference the laboratory’s policies and procedures
- The laboratory’s official quality policy statement, which shall include management system objectives and management’s commitment to ethical laboratory practices and to upholding the requirements of ISO 17025 and the TNI Standard
- Table of contents, and applicable lists of references, glossaries and appendices.

This Quality Assurance Manual also contains or references the following required items as defined by the 2009 TNI Standard (V1:M2, Section 4.2.8.4):

- All maintenance, calibration and verification procedures used by the laboratory in conducting tests
- Major equipment and reference measurement standards used as well as the facilities and services used by the laboratory in conducting tests
- Verification practices, which may include inter-laboratory comparisons, proficiency testing programs, use of reference materials and internal quality control schemes
- Procedures for reporting analytical results
- The organization and management structure of the laboratory, its place in any parent organization, and relevant organizational charts

- Procedures to ensure that all records required under ISO 17025:2005 and the TNI Standard are retained, as well as procedures for control and maintenance of documentation through a document control system that ensures that all standard operating procedures (SOPs), manuals, or documents clearly indicate the time period during which the procedure or document was in force
- Job descriptions of key staff and reference to the job descriptions of other laboratory staff
- Procedures for achieving traceability of measurements
- A list of all methods under which the laboratory performs its accredited testing
- Procedures for ensuring that the laboratory reviews all new work to ensure that it has the appropriate facilities and resources before commencing such work
- Procedures for handling samples
- Procedures to be followed for feedback and corrective action whenever testing discrepancies are detected, or departures from documented policies and procedures occur
- Policy for permitting departures from documented policies and procedures or from standard specifications
- Procedures for dealing with complaints
- Procedures for protecting confidentiality and proprietary rights
- Procedures for audits and data review
- Procedures for establishing that personnel are adequately experienced in the duties they are expected to carry out and are receiving any needed training;
- Policy addressing the use of unique electronic signatures

4.3.5 Standard Operating Procedures

Standard Operating Procedures (SOPs) are written procedures that describe in detail how to accurately and consistently reproduce laboratory processes or provide additional direction for laboratory personnel. Copies of all SOPs are accessible to all personnel. SOPs consist of three types:

- Technical SOPs, pertaining to a laboratory process which have specifically required details
- Administrative SOPs which document the more general organizational procedures.
- Quality SOPs that provide background and process for quality policy.

Each SOP indicates the effective date, the revision number, and the issuing authority(ies). Department Supervisor approval is required on technical procedures. Detailed information can be found in SOP# 010100, *Writing, Revising, and Maintaining Standard Operating Procedures*

Deviations from SOPs and Quality documents are not allowed without the permission of the Compliance Director, or designee. In the event that a deviation is requested, the circumstance is considered and the procedure is evaluated for necessary change and allowance.

The laboratory has SOPs for all analytical methods within its scope of accreditation. Any deviation from a method is documented in the method modifications section of the respective SOP, including both a description of the change made and a technical justification.

Each determinative method SOP includes or references (as applicable) the following:

- Scope and Application;
- Method Summary and Definitions;
- Health and Safety;
- Sample Preservation, Containers, Handling and Storage;
- Interferences;
- Equipment and Supplies;
- Reagents and Standards;
- Procedure;
- Data Analysis and Calculations;
- Quality Control and Method Performance;
- Data Validation and Corrective Action;
- Pollution Prevention and Waste Management;
- Method Modifications/Clarifications;
- References;
- Procedure Revision/Review History;

SOPs may not be reproduced, in part or in full, without written consent of ESC Lab Sciences. SOPs may not be altered in any way. Whether distributed internally or as a courtesy copy to customers or regulatory agencies, SOPs are considered confidential and proprietary information. Any copies in use within ESC Lab Sciences have been reviewed, approved, and properly controlled. Any copies of SOPs distributed outside of ESC Lab Sciences are uncontrolled, unless a customer or regulator specifically requests a controlled copy.

4.4 REVIEW OF REQUESTS, TENDERS, AND CONTRACTS

4.4.1 Procedure for Requests, Tenders, and Contracts Review

When ESC enters into a contract to provide laboratory services, it follows SOP# 020303, *Contract Review*. Upon receipt of a request or invitation to tender a bid/proposal, the customers' requirements are examined by the contract review personnel to establish that the necessary details are adequately outlined and that the laboratory is able and willing to meet them.

For routine/non-complex projects, a review by appropriate customer service personnel is considered adequate. Customer service confirms that the laboratory can meet the customer's data quality objectives, and the laboratory has any required certifications. Customer service will also confirm that the laboratory has the capacity to meet the customer's turn-around time needs.

4.4.2 Records of Reviews

Records of reviews of requests, tenders and contracts (including significant changes) are maintained. Records are also maintained of pertinent discussions with the customer relating to the customer's requirements and the results of the work during the period of execution of the contract.

4.4.3 Subcontracted Work

The review described above also encompasses any work that will need to be subcontracted to another laboratory. See section 4.5 below for more information about subcontracting work.

4.4.4 Deviations from the Contract

Applicable customers are informed of any deviation from any contract.

4.4.5 Contract Amendments

If a contract requires amendment after work has commenced, the same contract review process is repeated and any amendments are communicated to all affected parties.

4.5 SUBCONTRACTING

4.5.1 Subcontractor Competence

ESC only performs analytical techniques that are within its documented capability, when this is not possible, the laboratory follows SOP# 030209, *Subcontracting.* Subcontracting also occurs in the special circumstances where technical, safety, or efficiency issues dictate need. When subcontracting analytical services, the laboratory assures work requiring specific accreditation is placed with an accredited laboratory or one that meets applicable statutory and regulatory requirements of the project/customer. As part of the subcontractor approval process, a copy of the applicable certificates and scopes for subcontractor's accreditations is maintained as evidence of compliance.

4.5.2 Customer Notification

ESC notifies the customer of the intent to subcontract the work in writing. The laboratory typically gains the approval of the customer to subcontract their work prior to implementation, preferably in writing.

4.5.3 ESC Responsibility

ESC assumes responsibility for the qualifications of the subcontractor except when the customer or an authority specifies the subcontractor.

4.5.4 Subcontractor List

ESC maintains a list of all approved subcontract laboratories.

4.5.5 Identification of Subcontracted Work

All analytical reports, which contain data from subcontracted laboratories, include a statement which references the subcontractor laboratory/service.

4.6 PURCHASING SERVICES AND SUPPLIES

4.6.1 Purchasing Policies and Procedures

ESC maintains SOP# 030210, *Materials Procurement for Analytical Processes*, which describes the purchasing process, including vendor selection and acceptance criteria, for the purchase, storage, and evaluation of supplies and services. When relevant to the measurement integrity of analyses, ESC uses only services and supplies of adequate quality.

4.6.2 Quality of Purchased Items

Department supervisors are responsible for ensuring only supplies/chemicals that meet specified requirements are ordered. Where assurance of the quality of services or supplies is unavailable, the laboratory uses these items only after they have been inspected or otherwise verified for adequate quality. Records of inspections and verifications are maintained in the laboratory.

4.6.3 Purchasing Documents

Purchasing documents are maintained and they contain information that describes the services and supplies that were ordered. These purchasing documents are reviewed and approved by applicable personnel prior to release.

4.6.4 Approved Supplier List

Suppliers of critical services and supplies are evaluated. An approved list of material/service suppliers is maintained where products/services purchased affect the quality of data generated by the laboratory.

4.7 SERVICE TO THE CUSTOMER

ESC's Customer Service Department provides specific project service through the use of Technical Service Representatives (TSRs). The TSR is responsible for all contract requirements and laboratory/customer communication, including information concerning schedules, delays, and major deviations in the testing process.

4.7.1 Meeting Customer Expectations

ESC is willing to cooperate with its customers. The TSR works closely with the customer to clarify the customer's requests and to monitor the laboratory's performance in relation to the work requested, while ensuring confidentiality to other customers. The laboratory confidentiality policy prohibits divulging or releasing any information to a third party without proper authorization. See SOP# 010102, *Ethics, Data Integrity, and Confidentiality.* All electronic data (storage or transmissions) are kept confidential, based on technology and laboratory limitations, as required by customer or regulation. All electronic transmissions contain a confidentiality notice that represents the following:

Notice: This communication and any attached files may contain privileged or other confidential information. If you have received this in error, please contact the sender immediately via reply email and immediately delete the message and any attachments without copying or disclosing the contents. Thank you.

For additional information see SOP# 020301, *TSR (Project Management).*

4.7.2 Customer Feedback

ESC seeks customer feedback (both positive and negative) through various means including surveys and personal communication. This feedback is utilized to improve the management system, quality system, testing and calibration activities and customer services.

4.7.3 Customer Access to the Laboratory

Upon customer request, ESC provides reasonable access to relevant areas of the laboratory for witnessing capability and analytical performance. Confidentiality of all customers during this process is maintained.

4.7.4 Providing Supplemental Information

Upon request customers are provided supplementary information and records as needed. This includes, but is not limited to, the following: sample preparation records, packaging information, verification of calibrations, and analytical reference material information.

4.7.5 Communication with the Customer

ESC's Technical Service Representatives are required to maintain good communication with customers. Customers are informed of any delays or major deviations in the analytical work of the laboratory.

4.8 COMPLAINTS

Complaints are taken very seriously, and are typically initially addressed by customer service or sales. Other applicable laboratory personnel can be involved during the corresponding investigations and any needed corrective actions to provide customer support. Records of all complaints, investigations, and corrective actions are maintained. For more information see section 4.11 below for corrective actions and SOP #020302, *Client Complaint Resolution.*

4.9 CONTROL OF NON-CONFORMING WORK

4.9.1 Identification of Non-Conforming Work

Non-conforming work is work that does not conform to customer requirements, standard specifications, or documented laboratory policies/procedures. Some examples of non-conformances are departures from SOPs/test methods or quality control results that do not meet acceptance criteria. Identification of non-conforming work can come through various sources which include, but is not limited to; results of quality control samples and instrument calibrations, observations of laboratory personnel, data review, and internal audits.

4.9.2 Policies and Procedures

Many types of non-conformances are listed in the applicable SOPs along with the responsibilities and actions that are needed. Any needed corrections for these non-conformance events are taken immediately together with any decision about the acceptability of the nonconforming work.

In the event that a non-conformance is likely to reoccur or that there is doubt about the compliance of the laboratory's operations with its own policies or procedures; laboratory personnel will investigate the significance of the non-conformance and document corrective actions if applicable. When quality of the analytical data has been adversely affected, customers are notified and work is recalled as necessary. For more information see section 4.11 below for corrective actions and the SOP #030208, *Corrective and Preventive Action*.

Customer requests for departures must be pre-approved by appropriate laboratory personnel. These planned and pre-approved departures/non-conformances do not require reviews/investigations; however, they still must be documented. When necessary, planned and pre-approved non-conformances are noted in the final analytical report to advise the data user of any ramification to data quality.

4.9.3 Release of Nonconforming Work

The laboratory allows the release of nonconforming data only with approval on a case-by-case basis by the department supervisor, or their designee. Permitted non-conformances, such as QC failures, are fully documented and include the reason for the deviation and the impact of the departure on the data. Where necessary, customer service will notify the customer of the situation and will advise of any ramifications to data quality. Also where necessary, non-conformances are noted in the final analytical report to advise the data user of any ramification to data quality.

4.9.4 Stop Work Procedures

The Compliance Director and the Quality Assurance Director have the responsibility and authority to ensure the Quality System is implemented and followed at all times. In circumstances where a laboratory is not meeting the established level of quality or not following the policies set forth in this Quality Manual, the Compliance Director and the Quality Assurance Director have the authority to halt laboratory operations should he or she deem such an action necessary. The Compliance Director and/or the Quality Assurance Director will immediately communicate the halting of operations to the laboratory senior management and will keep them posted on the progress of corrective actions.

The department supervisors and members of senior management also have the authority to halt laboratory operations should they deem this action necessary. If this is done they will notify the Compliance Director and/or the Quality Assurance Director, and they will keep them informed about the progress of corrective actions.

All laboratory personnel have the authority to halt laboratory operations in the event that a situation impacts data validity or safety. When this action is deemed necessary, then the applicable supervisor must be notified of the situation as soon as possible. The supervisor and/or members of senior management will evaluate the severity of the situation for further decision making.

Once a stop work order has been approved and implemented, the Compliance Director and/or the Quality Assurance Director have the responsibility of ensuring the effectiveness of the corrective actions taken and authorizing the resumption of work.

4.10 IMPROVEMENT

Laboratory management demonstrates its commitment to quality by providing the resources (including facilities, equipment, and personnel) to ensure the adherence to the policies and procedures documented in this Quality Assurance Manual; and to promote the continuous improvement of the quality system. Continuous improvement of the quality system is also achieved by the implementation of the various aspects of this Quality Assurance Manual which include the following:

- The quality policy and objectives
- The internal and external auditing practices
- The review and analysis of data
- The corrective action process
- The preventive action process
- The managerial review process where the various aspects of the management/quality system are summarized, evaluated, and plans for improvement are developed.

4.11 CORRECTIVE ACTIONS

During the day-to-day laboratory operations, certain occurrences may warrant the necessity of corrective actions. These occurrences may take the form of analyst errors, deficiencies in quality control, method deviations, or other unusual circumstances. The laboratory's quality system provides systematic procedures for the documentation, monitoring, completion of corrective actions, and follow-up verification of the effectiveness of these corrective actions. This is done using the laboratory's Corrective Action and Preventative Action (CAPA) system that lists at a minimum; the deficiency by issue number, the deficiency source, responsible party, root cause, resolution, due date, and date resolved.

4.11.1 General Corrective Action Procedure

The following items are examples of sources of laboratory deviations or non-conformances that warrant some form of documented corrective action:

- Internal and External Audit Deficiencies
- Unacceptable Proficiency Testing (PT) Results
- Data or Records Review Deficiencies
- Customer Complaints
- Holding Time Violations

Documentation of corrective actions may be in the form of a qualifier or comment in the analytical data and/or on the final report that explains the deficiency. Corrective actions involving sample receiving are recorded on non-conformance forms and are attached to the applicable chain of custody. Documentation of corrective actions may also be a more formal corrective action report that is entered into the laboratory's Corrective Action and Preventative Action (CAPA) system. This depends on the extent of the deficiency, method requirements, the impact on the data, and any customer requirements for documentation.

The person who discovers the deficiency or non-conformance initiates the corrective action process. If a formal corrective action report is warranted, then the person initiating the corrective action must document the issue, the affected projects/samples, any known causes of the issue, and the corrective actions that they have taken. After this documentation is completed, the corrective action report is routed to the supervisor and/or to applicable personnel for notification of the issue and review. After the corrective action report is reviewed by the supervisor and/or applicable personnel, then it is routed to the quality assurance department for final review, verification, and signoff of the corrective action.

For more information see SOP #030208, *Corrective and Preventive Action.*

4.11.2 Root Cause Analysis

It is necessary that corrective actions taken address the root cause of the issue in order to prevent reoccurrences. In some cases, an identified cause equals to the "root cause" of the issue. In other cases, an identified cause is actually the outcome or symptoms of an underlying "root cause". Root cause analysis is the key and sometimes the most difficult part in the corrective action procedure. Often the root cause is not obvious and thus a careful analysis of all potential causes of the problem is required. Potential causes could include customer requirements, the samples, sample specifications, methods and procedures, staff skills and training, consumables, or equipment and its calibration.

In the event that the root cause is not obvious, laboratory personnel and management staff will start a root cause analysis by going through an investigative process. During this process, the following general steps must be taken into account: defining the non-conformance, assigning responsibilities, determining if the condition is significant, and investigating the root cause of the nonconformance. General non-conformance investigative techniques follow the path of the sample through the process looking at each individual step in detail. The root cause must be documented within the laboratory's Corrective Action and Preventative Action (CAPA) system.

4.11.3 Selection and Implementation of Corrective Actions

Where uncertainty arises regarding the best corrective action approach for addressing the root cause of an issue, appropriate laboratory personnel will recommend corrective actions that are appropriate to the magnitude and risk of the problem that will most likely eliminate the problem and prevent recurrence. If needed, senior laboratory management will then decide the best course of action needed. The corrective action that is chosen will then be implemented and documented in the laboratory's Corrective Action and Preventative Action (CAPA) system.

4.11.4 Monitoring of Corrective Actions

Personnel in the quality assurance department are responsible for monitoring the implementation and documentation of corrective actions to ensure that the corrective actions taken are effective. This verification of the corrective actions effectiveness is documented laboratory's Corrective Action and Preventative Action (CAPA) system.

4.11.5 Additional Audits

When the identification of non-conformances or departures casts doubt on compliance with the laboratory's policies, procedures, or regulatory requirements; laboratory management ensures that appropriate areas of activity are audited in

accordance with Section 4.14.1 as soon as possible. These additional audits can be short and focused to follow-up with the implementation of the corrective actions to confirm their effectiveness. Additional full-scale audits are only necessary when a serious issue or risk to the laboratory's business is identified.

4.12 PREVENTIVE ACTIONS

Preventive action is a pro-active process to identify opportunities for improvement rather than a reaction to the identification of problems or complaints. ESC takes advantage of several information sources to identify opportunities for improvement in all its systems including technical, managerial, and quality systems. These sources include, but are not limited to, the following:

- Identification of trends during data review
- Staff meetings
- Customer feedback, including complaints
- Managerial reviews

Some examples of preventative action include, but are not limited to, the following:

- Scheduled instrument maintenance (Preventative maintenance)
- Adding additional staff
- Acquisition of new equipment
- Training activities

All laboratory personnel have the authority to offer suggestions for improvements and to recommend preventive actions. However, it is ultimately the responsibility of laboratory management for implementing preventive action. When improvement opportunities are identified or if preventative action is required; then action plans are developed, implemented, and monitored to reduce the likelihood of the occurrence of non-conformities and/or to take advantage of the opportunities for improvement.

For more information see SOP #030208, *Corrective and Preventive Action.*

4.13 CONTROL OF RECORDS

Records are usually data recordings that include annotations, such as daily refrigerator temperatures, posted to laboratory forms, lists, spreadsheets, or analyst notes on a chromatogram. Records may be on any form of media, including electronic and hardcopy. Records allow for the historical reconstruction of laboratory activities related to sample handling and analysis.

4.13.1 General

Technical and quality assurance records are established and maintained to provide evidence of conformity to requirements and of the effective operation of the quality system. Mechanisms are established for records to remain legible, readily identifiable and retrievable. The laboratory maintains a record system appropriate to its needs, records all laboratory activities, and complies with applicable standards or regulations as required.

The laboratory has defined the length of time various records, pertaining to the management system and examination results, are to be retained. Retention time is defined by the nature of examination or specifically for each record. The laboratory retains all original observations, calculations and derived data, calibration records, chain of custody and a copy of the test report for a minimum of ten years, unless otherwise required by regulatory authority.

Documented records procedures SOP# 010103, *Document Control and Distribution Procedure*, and SOP# 020304, *Protection and Transfer of Records*, are established to define the means needed for the identification, storage, protection, retrieval, retention time, transfer, and/or disposition of records.

4.13.2 Technical and Quality Records

NOTE: ALL records/data are stored for a minimum of 10 years, unless otherwise noted.

All hardcopy department logbooks, such as temperature, maintenance, and preparation logs are placed into storage boxes and archived via a unique numbering system, to the ESC storage facility. Additional information regarding reagents/standards can be found in the Standards Logger (Tree) digital archive system. This digital system is backed up according to the ESC IT backup procedure.

Archived information and access logs are protected against fire, theft, loss, environmental deterioration, vermin, and in the case of electronic records, electronic or magnetic sources.

Data Storage Criteria	
Data Type	**Storage Criteria**
Manual Data Wet Chemistry	All manually generated data are stored in specific laboratory analysis workbooks. Each individual analysis is located in a separate notebook which contains all data relating to the test including, calibration curves/data, QC charts/limits, SOP, and completed analysis sheets. These notebooks are centrally located and contain completed data that is filed by analysis and date analyzed. Monthly – Data is removed from the notebook and placed in a dedicated filing cabinet. Semi-annually – Data is removed from the filing cabinet, placed in storage boxes and archived, via a unique numbering system, in the ESC storage facility
Manual Data Prep Labs	All logbooks utilized in manually recording sample preparation information are placed into storage boxes and archived, via a unique numbering system, in the ESC storage facility. This includes organic prep, metals prep, and TCLP.
Manual Data Env. Micro, Mold	All manually generated data is stored in specific laboratory files and notebooks. These files are centrally located and contain completed data that is filed by analysis and date analyzed. Data is placed into storage boxes and (when full) archived, via a unique numbering system, in the ESC storage facility.
All Data Aquatic Toxicity	All manually generated data is stored in specific laboratory files and notebooks. These files are centrally located and contain completed data that is filed by analysis and date analyzed. Data is placed into storage boxes and (when full) archived, via a unique numbering system, in the ESC storage facility. Final reports and Reference Toxicant results are also scanned into ESC's electronic document management system. The data storage device on which this data resides is backed up daily. Data files are archived on to magnetic tape and retained per laboratory policy.
Computerized Data - Organic Dept.	Injection logs are printed to PDF file and maintained with the data. The instrument data is printed to a secure server and remains in a format that cannot be changed after printed. Upon printing, the data in the original file is generated. This storage system is backed up nightly utilizing a seven-day rotation cycle. The data is immediately available for up to two years. After two years, raw instrument data files are archived onto a separate secure server and kept a minimum of ten years. Original raw data files cannot be edited.
Computerized Data – Inorganic Metals Dept.	All data produced by metals instrumentation is backed up to a secure drive, nightly, utilizing a seven-day rotation cycle. All data is archived on a network attached storage device and is immediately available for up to two years. After two years, raw instrument data files are archived on to a separate secure server and kept a minimum of ten years. Original raw data files cannot be edited.
Final Report Storage - LIMS	The LIMS facilitates access to any finished data and sample information by customer code, sample number, and parameter run number. Furthermore, any data pertaining to a sample or customer can be obtained. The LIMS also contains the information from the COC such as sample description, time and date collected, sampler ID, container type, preservative, sample receipt data, finished/approved analytical data, analyst, etc. The LIMS Oracle Database is backed up daily on tape. The back up tape is kept in secure storage. While all LIMS data are accessible, data older than six months is moved from the active production database and is available in an archive database.
Final Report Storage - PDF	Copies of all reports are stored according to customer code in PDF format on a network attached storage device and are immediately available for up to ten years**.** After ten years data files are archived onto magnetic tape and kept an additional ten years. These reports include chain of custody forms, login confirmation reports, the final approved printed report, invoices and any other associated documents. Samples that require subcontract work also have a copy of the final report in the customer file.
Misc. Data Storage	Company records that are not stored on a secure electronic device are placed in storage boxes and archived, via a unique numbering system, in the ESC storage facility. This includes quality records, such as audits, state certifications, PT results, internal audits, corrective actions, training files, logbooks, etc.

4.13.3 Records Disposal

Records that have exceeded the required storage requirement are disposed of through the use of professional records destruction firm or as required by regulatory or customer requirements. ESC retains the manifest of documents destroyed and files the verification receipt that is generated at the time of destruction. Additional guidance for records disposal is provided in the ESC SOP#020304, *Protection and Transfer of Laboratory Records*.

4.13.4 Records Transfer

In the event that corporate ownership is transferred or that laboratory activities are terminated for any reason, all records become property of the transferee in accordance with ESC SOP# 020304, *Protection and Transfer of Laboratory Records*.

4.14 AUDITS

Audits measure laboratory performance and verify compliance with accreditation and project requirements. Audits specifically provide management with an on-going assessment of the management system. They are also instrumental in identifying areas where improvement in the management/quality system will increase the reliability of data. Laboratory management is promptly notified of any finding that is of ethical concern.

4.14.1 Internal Audits

The quality assurance department is responsible for designing and/or conducting internal audits in accordance with a predetermined schedule and procedure. The purpose of these internal audits is to verify compliance with policies and procedures, and also to verify the on-going effectiveness of the laboratory's management system. Since internal audits represent an independent assessment of laboratory functions, the auditor must be functionally independent from laboratory operations to ensure objectivity. The auditor must be trained, qualified, and familiar enough with the objectives, principles, and procedures of laboratory operations to be able to perform a thorough and effective evaluation.

The complete internal audit process consists of the following sections:

- System and Method Audits – These are the traditional internal audit function and include analyst interviews to help determine whether laboratory practice matches method requirements and SOP language. Applicable raw analytical data and/or final report reviews are usually conducted in conjunction with these traditional internal audits. These audits are conducted according to a predetermined schedule.
- Compliance Data Reviews – These are thorough raw data and record reviews conducted by the quality assurance department that include (but are not limited to) sample receipt records, sample preparation records, analytical records, and the final analytical reports. A portion of the analytical data produced by the laboratory is randomly selected to undergo a compliance data review. These reviews are outside of the laboratory production environment which allows the data to be very closely examined without the pressure of time constraints.
- Corrective action follow-up audits are conducted on an as needed basis to ensure that documented corrective actions are implemented and to verify their effectiveness.

Full descriptions of the system and method internal audits are composed to include the following: identification of the section audited, the audit date, and the observations/findings of the audit. Findings from all internal audit processes will be routed to the applicable laboratory personnel for corrective action. The

responsible party will propose a plan of correction in a timely manner to correct all of the cited deficiencies. The proposed plan should include a time frame for the competition of the corrective actions. This time frame should depend on the complexity of the deficiencies and the amount of resources needed to properly correct the deficiency. The quality department reviews the responses to the internal audit findings. If the responses are determined to be adequate, then the quality department will use the action plan with the given time frame for verifying the completion of the corrective action(s). If the responses are determined to be inadequate, then the response is returned to the responsible party for modification. To complete the internal audit process, the quality department performs a re-examination of the areas where deficiencies were found to verify that all proposed corrective actions have been implemented. An audit deficiency is considered closed once implementation of the necessary corrective action has been audited and verified. If corrective action cannot be verified, the associated deficiency remains open until that action is completed.

In addition to the scheduled internal audits, unscheduled internal audits are conducted whenever doubts are cast on the laboratory's compliance with regulatory requirements or its own policies and procedures. These unscheduled internal audits may be conducted at any time and may be performed without an announcement to laboratory personnel.

When internal audit findings cast doubt on the validity of the laboratory’s testing results, the laboratory will take immediate corrective action and any affected customers should be notified in writing within one week of the discovery of the issue. If the issue is complex and the full scope of affected customers is not easily determined, then additional time might be required. However, this additional timeframe for customer notification of complex issues should not exceed one month of discovery.

All investigations resulting from data integrity issues are conducted in a confidential manner until they are completed. These investigations are documented, as well as any notifications made to clients receiving any affected data.

Additional information can be found in the SOP #010104, *Internal Audits.*

4.14.2 External Audits

It is the laboratory's policy to cooperate and assist with all external audits, whether performed by customers or an accrediting body. Management ensures that all areas of the laboratory are accessible to auditors as applicable and that appropriate personnel are available to assist in conducting the audit.

Audit teams external to the laboratory's organization will review the laboratory to assess the effectiveness of systems and degree of technical expertise. The quality department personnel will host the audit team and assist in facilitation of the audit process. Audit teams will usually prepare a formalized audit report listing deficiencies, recommendations, and/or observations. In some cases items of concern are discussed during an audit debrief that is conducted at the end of the external audit.

The laboratory personnel develop corrective action plans to address any external audit deficiencies with the assistance/guidance of the quality department. Laboratory management will ensure that the necessary resources are provided to effectively develop and implement the corrective action plans. The quality department collates this information and provides a written response to the audit team. The response contains the corrective action plan and expected completion dates for each element of the plan. The quality department is also responsible for following-up with laboratory personnel to ensure corrective actions are implemented and they are effective.

4.14.3 Performance Audits and Proficiency Testing

Performance audits are conducted periodically. Examples of performance audits include Proficiency Test (PT) sample analysis, internal single-blind sample analysis, and the analysis of double-blind samples that are submitted through a provider or a customer. Anything that tests the performance of the analyst and/or the method is considered to be a performance audit.

The laboratory participates in various proficiency testing samples (PT) as required by each accreditation, and obtains test samples from approved providers. Some exceptions are made for analytes where there is no PT available from an approved PT provider.

PT samples are treated as typical customer samples, utilizing the same staff, methods, equipment, facilities, and frequency of analysis. PT samples are included in the laboratory's normal analytical processes and do not receive extraordinary attention due to their nature.

The laboratory does not share PT samples with other laboratories, does not communicate with other laboratories regarding current PT sample results, and does not

attempt to obtain the assigned value of any PT sample from the PT provider.

The laboratory initiates an investigation and corrective action plan whenever PT results are deemed unacceptable by the PT provider. Additional PTs will be analyzed and reported as needed for accreditation purposes.

Additional information can be found in the SOP #030212, *Proficiency Testing Program.*

4.15 MANAGEMENT REVIEW

Laboratory management reviews the management system on an annual basis at a minimum. This allows for assessing program effectiveness and introducing changes and/or improvements.

At a minimum, following topics are reviewed and discussed:

- The suitability of policies and procedures
- Reports from managerial and supervisory personnel
- The outcome of recent internal audits
- Corrective and preventive actions
- Assessments by external bodies
- The results of interlaboratory comparisons or proficiency tests
- Changes in the volume and type of the work
- Customer feedback, including complaints
- Recommendations for improvement
- Other relevant factors, such as quality control activities, resources, and staff training

This managerial review must be documented for future reference. The results of the managerial review must feed into the laboratory planning system and must include goals, objectives, and action plans. Laboratory management ensures that any actions identified during the review are carried out within an appropriate and agreed upon timescale.

For more information see the SOP #010105, *Management Review*.

5.0 TECHNICAL REQUIREMENTS

5.1 GENERAL

5.1.1 ESC Lab Sciences recognizes that many factors determine the correctness and reliability of the analyses performed by a laboratory. These factors include contributions from:

- Human factors (See Section 5.2)
- Accommodations and environmental conditions (See Section 5.3)
- Test methods and method validation (See Section 5.4)
- Equipment (See Section 5.5)
- Measurement traceability (See Section 5.6)
- Sampling (See Section 5.7)
- Handling of samples (See Section 5.8).

5.1.2 The extent to which the factors contribute to the total uncertainty of measurement differs considerably between types of analyses. ESC Lab Sciences takes into account these factors in developing analytical procedures, in the training and qualifications of personnel, and in the selection and calibration of the equipment utilized.

5.2 PERSONNEL

5.2.1 General Personnel Management

ESC management ensures the competency of all who operate specific equipment, who perform analyses, and who evaluate results and approve data reports. Personnel performing specific tasks are qualified on the basis of appropriate education, training, experience, and/or demonstrated skills, as required.

5.2.2 Training

All personnel are trained and competent in their assigned tasks before they contribute to functions that can affect data quality. It is management's responsibility to ensure personnel are appropriately trained. All training and education requirements are outlined in SOP #030205, *Technical Training and Personnel Qualifications* and in SOP #350355, *Technical Training and Personnel Qualifications for Biology*. Training requirements for safety and health are listed in the *Chemical Hygiene Plan*. These procedures are reviewed/updated periodically by laboratory management. Training records are maintained by the laboratory for a minimum of 10 years.

5.2.2.1 Demonstration of Capability (DOC)

Analysts complete an initial demonstration of capability (IDOC) study prior to performing a method or when there is a change in instrument type, personnel, or test method. IDOCs are also performed when a method has not been performed by the laboratory or analyst in a 12-month period. The mean recovery and standard deviation of each analyte, taken from 4 replicates of laboratory control samples, is calculated and compared to method criteria or established laboratory criteria for evaluation of acceptance. For methods or procedures that do not lend themselves to the “4-replicate approach, the demonstration of capability requirements will be specified in the applicable SOP. Copies of all demonstrations of capability are maintained for future reference.

Demonstrations of capability are verified on an annual basis. These are Continuing Demonstrations of Capability (CDOC). For CDOCs Performance Testing (PT) samples may be used in lieu of the 4-replicate approach listed above.

For more information see the SOP #030205, *Technical Training and Personnel Qualifications* and SOP #350355, *Technical Training and Personnel Qualifications for Biology*.

5.2.2.2 Training for New Staff

New staff members are given the following training, where appropriate:

- Ethics and Data Integrity
- ESC Policy Manual
- ESC Quality Assurance Manual
- Chemical Hygiene Plan (safety)
- Applicable standard operating procedures
- Basic laboratory tasks such as balance, thermometer, and pipette operations
- Use of laboratory records
- Any other specific training as appropriate to their function

Analysts must complete training satisfactory before they can work independently. When staff members undergo training, adequate and appropriate supervision by fully trained analysts is provided. Only when a new analyst has successfully passed their Initial Demonstration of Capability (IDOC) described above, may he or she conduct testing of customer samples.

For more information see the SOP #030205, *Technical Training and Personnel Qualifications* and SOP #350355, *Technical Training and Personnel Qualifications for Biology*.

5.2.2.3 Ongoing Training

Staff members are given the following ongoing training:

- Ethics and Data Integrity Training
- Safety Training
- Routine Training – Routine training may become necessary for a person to perform a particular job effectively. This includes any changes in policies and procedures as appropriate.
- Special Training – Special training may become required as a result of new technologies, contracts, expanding markets, company-wide improvement programs, new method development, etc.

Analysts must satisfactorily perform Continuing Demonstrations of Capability (CDOC) on an annual basis.

For more information see the SOP #030205, *Technical Training and Personnel Qualifications* and SOP #350355, *Technical Training and Personnel Qualifications for Biology*.

5.2.2.4 Ethics and Data Integrity Training ”

Data integrity training is provided to all new employees (including contract and temporary), and a refresher is given at least annually for all employees. Employees are required to understand that any infractions of the laboratory data integrity procedures shall result in a detailed investigation that could lead to very serious consequences including immediate termination, debarment, or civil/criminal prosecution. The initial data integrity training and the annual refresher training needs to have a signature attendance sheet or other form of documentation that demonstrates all staff have participated and understand their obligations related to data integrity.

All ESC personnel, including contract and temporary, are required to sign an “Attestation of Ethics and Confidentiality at the time of employment and during annual refresher training. This document clearly identifies inappropriate and questionable behavior. Violations of this document result in serious consequences, including prosecution and termination, if necessary. The ESC Policy Manual addresses this subject in detail. Also see SOP# 010102, *Ethics, Data Integrity, and Confidentiality* for more information.

Data integrity training emphasizes the importance of proper written narration on the part of the analyst with respect to those cases where analytical data may be useful, but are in one sense or another partially deficient. The following topics and activities are covered:

- ESC’s mission and its relationship to the critical need for honesty and full disclosure in all analytical reporting

- How and when to report data integrity issues
- Record keeping
- Training, including discussion regarding all data integrity procedures
- Data integrity training documentation
- In-depth data monitoring and data integrity procedure documentation
- Specific examples of breaches of ethical behavior such as improper data manipulations, adjustments of instrument time clocks, and inappropriate changes in concentrations of standards.

5.2.2.5 Identification of Training Needs

In order to ensure personnel are appropriately trained, laboratory management is responsible for identifying training needs for both current and future anticipated laboratory tasks. This includes (but is not limited to) the following:

- Evaluation of routine quality control data
- Proficiency testing results
- Findings of internal and external audits
- Management reviews
- Periodic performance reviews

5.2.2.6 Evaluation of the Effectiveness of Training

In order to ensure personnel are appropriately trained, laboratory management is responsible for evaluating the effectiveness of the training program. This includes (but is not limited to) the following:

- Evaluations of Demonstrations of Capability (DOCs)
- Monitoring ongoing quality control data
- Proficiency testing results

5.2.3 Competency and Supervision of Personnel

Laboratory management ensures all personnel (including part-time, temporary, contracted, and administrative personnel) are competent, appropriately supervised, and work in accordance to the established management system. This includes training in policies, procedures, ethics, laboratory quality assurance, and safety as applicable to their role in the laboratory.

5.2.4 Job Descriptions

Employee qualification requirements are maintained by the Human Resources Department and are facilitated through the use of written job descriptions. Educational requirements and experience are included in the job description. Laboratory management determines the specific education and experience

requirements for individual positions within the laboratory based on the specific department needs.

5.2.5 Authorization of Technical Personnel

Laboratory management authorizes specific personnel to perform particular technical duties. Records of the relevant authorization(s), education, and experience of all technical personnel are maintained by the Human Resources Department. Confirmation of competence of all technical personnel is required initially by successfully performing a demonstration of capability. All technical personnel are also required to continue to demonstrate their capability at least annually to produce reliable results through accurate analysis of certified reference materials, proficiency testing samples, and/or routine quality control samples to remain authorized to perform particular technical duties.

5.3 ACCOMMODATION & FACILITY DESIGN

5.3.1 Laboratory Facilities

The design of the laboratory supports good laboratory practices and does not adversely affect measurement integrity.

5.3.2 Environmental Conditions

All ESC laboratory facilities, analytical areas, energy sources, lighting, heating, and ventilation facilitate proper performance of calibrations and tests. The laboratory ensures that housekeeping, electromagnetic interference, humidity, line voltage, temperature, sound and vibration levels are appropriately controlled to ensure the integrity of specific measurement results and to prevent adverse effects on accuracy or increases in the uncertainty of each measurement.

Environmental conditions are monitored, controlled, and recorded as required by the relevant specifications, methods, and procedures. Laboratory operations are stopped if it is discovered that the laboratory's environmental conditions jeopardize the analytical results.

5.3.3 Separation of Incompatible Activities

ESC Lab Sciences maintains multiple buildings on its campus. This allows for physical separation of incompatible analytical activities. For example, the analysis for volatile organic compounds is in a separate building from where samples are extracted for semi-volatile organic compounds.

Each laboratory structure is specifically designed for the type of analytical activity that it contains. The air handling systems, power supplies, and gas supplies are specific for each laboratory department.

5.3.4 Laboratory Security

Laboratory security is maintained by controlled access and through video surveillance. Entrance into any ESC building requires an electronic ID badge with appropriate assigned access. Access is controlled to each area depending on the required personnel, the sensitivity of the operations performed, and possible safety concerns. The main entrance is kept unlocked during normal business hours for visitors, and is continuously monitored by laboratory staff. All visitors must sign a visitor's log, and a staff member must accompany them during the duration of their stay.

5.3.5 Good Housekeeping

ESC ensures good housekeeping practices in all facilities to maintain a standard of cleanliness necessary for analytical integrity and personnel health and safety. Where necessary, areas are periodically monitored to detect and resolve specific contamination and/or possible safety issues.

5.4 TEST METHODS AND VALIDATION

5.4.1 General

ESC Lab Sciences uses appropriate methods and procedures for all analyses within its scope. These include sampling, handling, transport, storage, and preparation of samples to be analyzed, and, where appropriate, an estimation of the associated measurement uncertainty as well as statistical techniques for analysis of data.

ESC Lab Sciences has instructions (SOPs) on the use and operation of all relevant equipment and on the handling and preparation of samples for analysis, where the absence of such instructions could jeopardize the results. All instructions, standards, manuals and reference data relevant to the work of the laboratory are maintained current and are readily available to personnel (see section 4.3). Deviations from methods occur only if the deviation has been documented, technically justified, authorized, and accepted by the customer.

5.4.2 Selection of Methods

ESC Lab Sciences uses analytical methods, including methods for sampling, which meet the needs of the customer and are appropriate for the analyses performed. Methods utilized are preferably those published as international, regional, or national standards. The laboratory ensures that it uses the latest valid

edition of a method unless it is not appropriate or possible to do so or unless regulatory requirements dictate specific revision use. Methods are supplemented with Standard Operating Procedures that list additional details to ensure consistent application.

When a customer does not specify the method to be used, the laboratory selects appropriate and approved methods that have been designated by the project's regulatory program. The customer is informed as to the method chosen.

The laboratory confirms that it can properly operate published analytical methods before analyzing samples (see section 5.4.5). If there is a change in the published analytical method, then the confirmation is repeated.

ESC Lab Sciences will inform customers when methods they choose are considered inappropriate and/or out of date.

5.4.3 Laboratory Developed Methods

Introduction of analytical methods developed by the laboratory for its own use is a planned activity and is assigned to qualified personnel equipped with adequate resources.

Plans are updated as development proceeds and effective communication is maintained with all personnel involved in the development process.

5.4.4 Non-Standard Methods

When it is necessary to employ methods not published and/or approved by industry standards, these are subject to agreement with the customer and must include a clear specification of the customer's requirements and the purpose of the analysis. The method developed must be validated appropriately before use.

For new non-standard analytical methods, procedures are developed prior to the analysis of samples and contain at least the following information:

- Appropriate identification
- Scope
- Description of the type of item to be analyzed
- Parameters or quantities and ranges to be determined
- Apparatus and equipment, including technical performance requirements
- Reference standards and reference materials required
- Environmental conditions required and any stabilization period needed
- Description of the procedure, including:
  - Affixing identification marks, handling, transporting, storing and preparing of items
  - Checks to be made before the work is started

  - Verifying equipment function and, where required, calibrating and/or adjusting the equipment before each use
  - Method of recording the observations and results
  - Any safety measures to be observed
- Criteria and/or requirements for approval/rejection
- Data to be recorded and method of analysis and presentation
- Uncertainty or procedure for estimating uncertainty

5.4.5 Validation of Methods (Also see SOP #030211, *Method Validation*)

5.4.5.1 Validation Description

Validation is a process of confirmation by examination and the provision of objective evidence that the stated requirements for a specific method/procedure are fulfilled.

5.4.5.2 Validation Summary

The laboratory validates all analytical methods used to some degree. The validation is as extensive as is necessary to meet the needs in the given application or field of application. The laboratory records the results obtained, the procedure used for the validation, and a statement as to whether the method is fit for the intended use.

5.4.5.3 Validation for Customer Need

The range and accuracy of the values obtainable from validated methods are assessed for the intended use as relevant to the customers' needs. Examples of this assessment include examining the uncertainty of the results, detection limit, selectivity of the method, linearity, limit of repeatability and/or reproducibility, robustness against external influences, and/or cross sensitivity against interference from the matrix of the sample.

5.4.5.4 Method Detection Limits and Reporting Limits

Descriptions of analytes, preparative and analytical methods, matrices, accuracy and precision targets, and MDLs and RLs are presented in the QA Manual Appendices.

Limits of Detection (LODs)/Method Detection Limits (MDLs)

Detection limits are determined annually (or after any major changes to the analytical system and/or procedures) and are comparable to those established by the EPA and are not typically lower than recommended detection limits. To determine whether the EPA detection limit is being achieved, an MDL study is performed according to 40 CFR Part 136, Appendix B or the currently accepted and approved guidance. When using the Appendix B guidance, the standard deviation of, at least, seven replicate standards at or near the expected detection limit is calculated. MDLs are determined such that the risk of reporting a false positive is less than 1%. The method detection limit (MDL) is calculated as follows:

MDL = T S

where: S = Standard Deviation of replicate measurements
T = Student's t value appropriate for a 99% confidence level and a standard deviation estimate with n-1 degrees of freedom.

If the MDL is higher than the EPA-method-suggested MDL, the calculated value is used as a basis for establishing the reporting limit (RL) for reporting. MDLs are re-calculated on an annual basis or sooner if a material change in the instrumentation or method is enacted, or a change in the calibration response factor is noted. Additional studies may also be conducted to enhance the program.

Published MDLs may be set higher than experimentally determined MDLs to: 1) avoid observed positive interferences from matrix effects or common reagent contaminants or 2) for reporting convenience (i.e., to group common compounds with similar but slightly different experimentally determined MDLs).

Method detection limit studies may also utilize additional study components to better reflect practices to produce a more realistic detection limit as approved by regulatory guidance/requirements. Blank background studies yielding a value for the blank contributions at low level quantitations during routine analysis may be utilized to calculate detection limits that further ensure that the incidence of reporting false positives and false negatives is greatly reduced in some applications.

Any alternate or modified method for the determination of MDL studies utilized at ESC must be approved for the application for which it is used and be technically justified in its use to provide an improvement in the data being generated within the study.

For more information see SOP# 030206, *Method Detection Limits*

Limits of Quantitation (LOQs)/Reporting Limits (RLs)

A limit of quantitation (LOQ) for every analyte of concern must be determined. The LOQ must be higher than the MDL/LOD and are typically set 3 -10 times the calculated MDL determined above. The LOQ is often referred to as the Reporting Limit (RL). This RL is based on the lowest calibration standard concentration that is used in each initial calibration. Results below this level are not allowed to be reported without qualification since the results would not be substantiated by a calibration standard". For methods with a determined LOD, results can be reported out below the LOQ but above the LOD if they are properly qualified (e.g. J flag).

5.4.5.5 Demonstration of Capability

Analysts complete an initial demonstration of capability (IDOC) study prior to performing a method or when there is a change in instrument type, personnel, or test method. IDOCs are also performed when a method has not been performed by the laboratory or analyst in a 12-month period. The mean recovery and standard deviation of each analyte, taken from 4 replicates of laboratory control samples, is calculated and compared to method criteria or established laboratory criteria for evaluation of acceptance. For methods or procedures that do not lend themselves to the "4-replicate approach, the demonstration of capability requirements will be specified in the applicable SOP. Copies of all demonstrations of capability are maintained for future reference.

Demonstrations of capability are verified on an annual basis. These are Continuing Demonstrations of Capability (CDOC). For CDOCs Performance Testing (PT) samples may be used in lieu of the 4-replicate approach listed above.

For more information see the SOP #030205, *Technical Training and Personnel Qualifications* and SOP #350355, *Technical Training and Personnel Qualifications for Biology*.

5.4.6 Measurement Uncertainty

When required, or upon customer request, ESC Lab Sciences can provide an estimate of the analytical uncertainty of test results.

The exact nature of some test methods may preclude rigorous, statistically valid estimation of analytical uncertainty. In these cases the laboratory attempts to identify all components of analytical uncertainty and make a reasonable estimation, and ensures that the form of data reporting does not give a wrong impression of the uncertainty. A reasonable estimation shall be based on knowledge of method performance and previous experience. When estimating the analytical uncertainty, all uncertainty components which are of importance in the given situation shall be taken into account.

In those cases where a well-recognized test method specifies limits to the values of the major source of uncertainty of measurement and specifies the form of presentation of calculated results, the laboratory is considered to have satisfied the requirements on analytical uncertainty by following the test method and reporting instructions.

For more information about the estimation of analytical measurement uncertainty see SOP #030221, *Measurement of Uncertainty*

5.4.7 Control of Data

5.4.7.1 Calculations and Data Transfer Checks

To ensure that data is protected from inadvertent changes or unintentional destruction, the laboratory uses procedures to check calculations and data transfers. This includes (but is not limited to) the following:

- Peer data review and internal audits of raw data
- Calculations on electronic benchsheets/spreadsheets are password protected
- Where possible, audit trail software features are utilized
- Where possible, data is uploaded directly from the instrument
- Electronic data files are backed-up routinely

5.4.7.2 Automated Acquisition

When computers or automated equipment are used for the acquisition, processing, recording, reporting, storage or retrieval of data, the laboratory ensures that:

- Computer software developed by the laboratory is documented in sufficient detail and suitably validated as being adequate for use
- Procedures are established and implemented for protecting the data. Such procedures include (but are not be limited to) integrity and confidentiality of data entry or collection, data storage, data transmission, and data processing
- Computers and automated equipment are maintained to ensure proper function and are provided with the environmental and operating conditions necessary to maintain the integrity of data
- Individual user names and passwords are required for all Laboratory Information Management Systems (LIMS)
- Upon employment, laboratory employees are provided initial training in computer security awareness and ongoing refresher training is conducted an annual basis
- Periodic inspections of LIMS are performed to ensure the integrity of electronic data
- Customers are notified prior to changes in LIMS software or hardware configurations that will adversely affect the customer's electronic data
- Spreadsheets used for calculations are verified before initial use and after any changes to equations or formulas, including software revision upgrades. Formula cells are write-protected to minimize inadvertent changes to the formulas.
- Procedures have been established for:
  - Methods of software development that are based on the size and nature of the software being developed
  - Testing and QC methods to ensure that all software accurately performs its intended functions, including:
    - Acceptance criteria
    - Tests to be used
    - Personnel responsible for conducting the tests
    - Records of test results
    - Frequency of continuing verification of the software
    - Test review and approvals
  - Software change control methods that include instructions for requesting, authorizing, requirements to be met by the software change, testing, QC, approving, implementing changes, and establishing priority of change requests

  - Software version control methods that record the software version currently used. Data sets are recorded with the date and time of generation and/or the software version used to generate the data set;
  - Maintaining a historical file of software, software operating procedures, software changes, and software version numbers
  - Defining the acceptance criteria, testing, records, and approval required for changes to LIMS hardware and communication equipment.
- Records maintained in the laboratory to demonstrate the validity of laboratory generated software include:
  - Software description and functional requirements
  - Listing of algorithms and formulas
  - Testing and QA records
  - Installation, operation and maintenance records
- Electronic data security measures ensure the following:
  - Individual user names and passwords have been implemented
  - Operating system privileges and file access safeguards are implemented to restrict the user of the LIMS data to users with authorized access ”
  - All LIMS users are trained in computer awareness security on an annual basis
  - System events, such as log-on failures or break-in attempts are monitored
  - The electronic data management system is protected from the introduction of computer viruses
  - System backups occur on a regular and published schedule and can be performed by more than just one person
  - Testing of the system backups must be performed and recorded to demonstrate that the backup systems contain all required data
  - Physical access to the servers is limited by security measures
- Commercial “off the shelf software, e.g., word processing, database and statistical programs in general use within its designed application range may be considered sufficiently validated. However, laboratory software configuration/modifications are validated as above.

ESC Software Systems

Table 5.4.7a LIMS	
System	**Description**
LIMS	The LIMS is a computerized database for data management. Access to the system is protected by coded password and access is granted based on user need.
Security	Level 1. Login, sample status, shipping/sample kits. General access, every station has access. Level 2. Data Review, data approval, edit data. The secondary review team, lab supervisors, and QA have access to this level.
Hardcopy Records	All paper records are retained by ESC and/or are stored within ESC's Document Management System (Cyberlab/Openlab) in pdf and/or excel format. As the pages become historical (prior to the current working range of log numbers), they are removed from the logbook, prep book, or workbook in sequential order and permanently bound for storage in banker's boxes and/or are stored within ESC's Document Management System (Cyberlab/Openlab) in pdf and/or excel format. They are cross-referenced by sample log number, date and storage number.
Data Records	*Data* is available on electronic media. *Revisions* to the LIMS software are documented within the code. Each revision indicates the change in function, programmer's initials, and date of change. Programming has limited access and is accessible only by approved individuals through the use of passwords.
Calculations	All calculations performed by the LIMS are approved and submitted by the Laboratory Supervisors. Each calculation is tested parallel to manual calculations to ensure proper function.
Automatic Data Transfer	Data is transferred electronically from instrumentation by way of ESC customized software (Tree) directly to the LIMS. Data is also transferred electronically by way of ESC customized software (Prep Data) that transfers/saves Prep Data directly into the LIMS Database. Once the data has been transferred, it undergoes a screen review to ensure it has been transferred properly.

Table 5.4.7b AUXILIARY SOFTWARE	
System	**Description**
Auxiliary	Auxiliary Computer and Software Used to Generate and Validate Data
General	Several instruments have their own dedicated single computer and manufacturer-designed software to run them. Instruction manuals and other documentation provided by each manufacturer are maintained. ESC receives updates as they become available from the manufacturer. All raw and filtered data is stored on media (with uniquely titled data files on floppy discs) and all associated printouts and paperwork is filed. The original raw data is not accessed again unless it is subjected to uncertainty.
Method Files	Creation of any method or analyte files, necessary to run the appropriate analyses is the responsibility of the Department Supervisor. The Supervisor verifies that the compounds, wavelengths, retention time windows, calculation criteria, and other relevant parameters are correctly input into the specific method file. Analysts may only use the method files that have been specifically generated by the Supervisor.
Supplier Info	All purchased software that is used in conjunction with software specific instruments is guaranteed by the supplier to function as required. The supplier of the software performs all troubleshooting or software upgrades and revisions.
Validation	Computer software is validated for proper performance. The result of the validation is recorded, when in-house programming is the source of the calculation.

5.4.7.3 Data Reduction and Review

All analytical data must undergo a multi-tiered review process prior to being reported to the customer. Data review is the process of examining data and accepting or rejecting it based on pre-defined criteria. These review steps are designed to ensure that reported data is free from errors and any non-conformances are properly documented. The laboratory's multi-tiered data review process is discussed below. Additional information regarding the data reduction and review process can be found in SOP #030201, *Data Handling & Reporting* and SOP #030227, *Data Review*.

Primary Data Review – Analysts performing the analysis are responsible for the initial data reduction and review, and have the primary responsibility for the quality of the data produced. The analysts initiate the data review process by reviewing and accepting/rejecting the data. This includes, but is not limited to; confirming all samples were prepared/analyzed according to the appropriate method and laboratory SOP, verifying dilutions are calculating properly, ensuring good chromatography, verifying proper spectral interpretations, evaluating quality control data, verifying that any customer/project specific requirements are met, and noting any non-conformances. The primary analyst is also responsible for compiling the initial data package for further data review.

Secondary Data Review – After the analyst have completed the primary data review process, the data package is then available for secondary data review that is performed by a qualified reviewer. This reviewer provides an independent technical assessment of the data. This includes, but is not limited to; confirming all samples were prepared/analyzed according to the appropriate method and laboratory SOP, verifying dilutions are calculating properly, ensuring good chromatography, verifying proper spectral interpretations, evaluating quality control data, verifying that any customer/project specific requirements are met, and noting any non-conformances. Secondary data reviews must also verify that all manual entries of raw data are accurate and there are no transcription errors.

Final Administrative Review – All final reports receive a final administrative review of some degree. Once the data have been technically reviewed and approved in the secondary data review process, authorization for release of the data from the analytical section is indicated in the LIMS. A Technical Service Representatives (TSR) will then perform a final administrative review of the data which includes examining the report for method appropriateness, detection limit/QC acceptability, and any other apparent errors. If no errors are found, the TSR approves the report in LIMS and the customer has the reports emailed to them. If errors are noted, the data is returned to the department for correction and resubmission to the TSR. In the case of DoD work, 100% of all packages must have a final administrative review to confirm that primary and secondary reviews were recorded properly and the data package is complete.

Compliance Data Review – Compliance data reviews are performed by the Quality Department staff and are considered to be part of the overall internal audit program of the laboratory. These reviews are typically performed after the data has been released to the customer. A list is produced weekly from LIMS showing all methods run by the laboratory and how many batches were analyzed the previous week. Some of these data packages will undergo a compliance data review as per a schedule set by this department. For DoD work, at least 10% of all data packages will reviewed for technical completeness/accuracy.

5.5 EQUIPMENT

5.5.1 Availability of Equipment

Laboratory management ensures that the laboratory is furnished with all the equipment required for the correct performance of the analytical tests it performs. In cases where the laboratory needs to use equipment outside its permanent control, the laboratory ensures that all requirements related to calibration, maintenance, and records are satisfied.

5.5.2 Calibration of Equipment

The laboratory ensures that equipment and its software used for sampling and analysis is capable of achieving the accuracy required and complies with specifications relevant to the methods concerned. Calibration procedures are established for instruments and equipment that have a significant effect on the analytical results. Before being placed into service, newly obtained equipment (including that used for sampling) is calibrated and/or verified to establish that it meets the laboratory's specification requirements and complies with the method specifications. All analytical equipment is calibrated and/or verified before use.

For analytical instrumentation, the most appropriate curve fitting model from among the following choices must be utilized (given in the order of preference):

- Average Response Factor
- Linear – No Weighting
- Linear – 1/X Weighting
- Linear – $1/X^2$ Weighting
- Quadratic

When second order (quadratic) curves are evaluated, acceptability must include an assessment of a graphic representation of the curve to confirm that this fit type is not being used to mask detector saturation and that the curve (which defines a parabola) does not result in two concentrations for one response. Higher order polynomial curves (i.e., third-order and greater) are not allowed at ESC.

5.5.3 Operation of Equipment

Analytical equipment is operated only by authorized personnel. Up-to-date instructions and procedures for the use and maintenance of analytical equipment are readily available for use by the appropriate laboratory personnel. This includes any relevant equipment manuals provided by the manufacturer.

5.5.4 Identification of Equipment

Analytical equipment used that is significant to the analytical results is uniquely identified when practical.

5.5.5 Records of Equipment

Records are maintained for analytical equipment used that is significant to the analytical results. These records include at least the following:

- Identity of the equipment (and software if applicable)
- Manufacturer's name, type of equipment, and serial number or other unique identification
- Checks that equipment complies with specifications (see 5.5.2)
- Current location, where appropriate
- Manufacturer's instructions, if available, or reference to their location
- Dates, results, and reports of all calibrations, adjustments, acceptance criteria, and the due date of next calibration where appropriate
- Maintenance carried out to date. Also, the maintenance plan where appropriate
- Any damage, malfunction, modification, or repair to the equipment
- Date placed in service
- Condition when received (e.g., new, used, reconditioned)
- Operational status
- Instrument configuration and settings

5.5.6 Handling of Equipment

The laboratory has established procedures for the safe handling, transport, storage, use, and any planned maintenance of analytical equipment to ensure proper functioning and in order to prevent contamination or deterioration. These procedures include the checks necessary to ensure proper functionality when analytical equipment is returned from being used outside of the permanent control of the laboratory.

5.5.7 Out of Service Equipment

Equipment that has been subjected to overloading, mishandling, gives suspect results, has been shown to be defective, or is performing outside of specified limits is taken out of service. Out of service equipment is isolated and/or clearly labeled to prevent accidental use until it has been repaired and shown to perform correctly. When analytical equipment is taken out of service, the laboratory examines the potential effect it may have had on previous analytical results to identify any non-conforming work (see section 4.9 above).

5.5.8 Calibration Status of Equipment

Whenever practicable, all laboratory equipment requiring calibration is labelled, coded, or otherwise identified to indicate the status of calibration, including the date when last calibrated and the date or expiration criteria when recalibration is due. This requirement is mostly applicable to support equipment such as balances, mechanical pipettes, and temperature reading devices which require periodic calibration. Major analytical equipment that is calibrated and/or verified at time of use does not need to be labeled with its calibration status. Calibration records described in section 5.5.5 above are sufficient to indicate the calibration status.

5.5.9 Returned Equipment Checks

When, for whatever reason, equipment goes outside the direct control of the laboratory, the laboratory ensures that the function and calibration status of the equipment are checked and shown to be satisfactory before the equipment is returned to service.

5.5.10 Equipment Intermediate Checks

When intermediate checks are needed to maintain confidence in the calibration status of the equipment, these checks are carried out according to a defined procedure. These intermediate checks include continuing calibration verification checks performed on major analytical equipment, and also periodic checks of support equipment such as balances and pipettes.

5.5.11 Equipment Correction Factors

Where calibrations give rise to a set of correction factors, the laboratory has procedures to ensure that copies (e.g., in computer software) are correctly updated.

5.5.12 Safeguarding of Equipment Integrity

Analytical and supporting equipment is protected from inadvertent adjustments that could affect the integrity of the laboratory results. Instruments are located in access-protected areas. Software is tested and approved before use. Spreadsheets

used in the calculation of analytical results are tested, approved, and locked before being placed into service.

Table 5.5 General Equipment Calibration

Equipment	Activity	Frequency	Record Type
Balances	Verified with Class I NIST traceable weights when used	Daily, before use	Logbook – Located in each respective lab
Balances	• Clean • Check alignment • Service Contract Top-loading balances are allowed a tolerance of ±1%, while analytical balances are allowed a tolerance of ±0.1%.	At least once annually by a qualified vendor	Certificates from contractor.
Weights – Class I	• Only use for the intended purpose • Use plastic forceps to handle • Keep in case • Store in desiccator • Re-calibrate	Checked for accuracy by an external source, at least every 5 years, or sooner if necessary.	Certificates from contractor.
pH meters	Calibration: • pH buffer aliquot are used only once • Buffers used for calibration bracket the pH of the media, reagent, or sample analyzed. • Check must perform within 0.05 pH units. Temperature correction is performed either automatically by the instrument or manually depending upon the instrument used. Automatic temperature compensation probes are verified annually.	Before use	Calibrations are recorded in a logbook.
Automatic pipettes	Verify for accuracy and precision using reagent water and analytical balance	In-house – Monthly Contract – Semi Annually Tolerance is set at 2.0%, (ASTM standard = 3%).	Monthly verifications are recorded in a logbook. Semi-annual cal. is verified by certificates from the cal. service.
Refrigerators, Freezers, Hot plates and BOD incubators	• Thermometers are immersed in liquid to the appropriate immersion line • The thermometers are graduated in increments of 1°C or less • Temperature ranges are listed in app. SOPs	Temperatures are recorded each day in use	Logbook
Ovens	• Thermometers are immersed in sand to provide even measurement • The thermometers are graduated in increments of 1°C or less	Temperatures are recorded each day in use	Logbook

Table 5.5 General Equipment Calibration			
Equipment	**Activity**	**Frequency**	**Record Type**
Thermometers	ESC NIST-certified thermometers	Calibrated at least every 5 years, or sooner if necessary by a NIST calibration service, accredited to ISO/IEC 17025 and ANSI/NCSL Z540-1.	Calibration certificates from the calibration service.
	All working thermometers	Verified at least annually against NIST-certified thermometers by an outside service.	"Accuracy Assurance Program Test Data Sheets provided by the servicer. All thermometers are tagged with current tolerances. Internal daily checks are recorded in a logbook.
DO Meter	Calibrated according to manufacturer's specifications. Using the recorded temperature and barometric pressure the meter is calibrated to the air saturation of dissolved oxygen using a conversion chart provided by the manufacturer.	Before use	Calibration of each meter is recorded in a separate logbook.
Specific Conductivity Meter	The conductivity meter is calibrated according to manufacturer's specifications. Temperature correction is performed either automatically by the instrument or manually depending upon the instrument used. • Biomonitoring, potassium chloride with a conductivity value of 100 and 1000µmhos/cm is used as the calibration standard. • Wet Lab, potassium chloride with a value of 1413µmhos/cm is purchased from NSI for calibration purposes.	Before use	Calibration of each meter is recorded in separate daily logbooks.
Fume Hoods	Check quarterly and must meet the OSHA minimum recommended face velocity of 60 – 100fpm.	Quarterly	Electronic log

5.6 MEASUREMENT TRACEABILITY

5.6.1 General

All analytical equipment used, including support equipment, having a significant effect on the accuracy or validity of the result of the analysis, calibration or sampling is calibrated before being put into service. The laboratory has established procedures for the calibration and/or verification of this equipment. See the applicable analytical SOPs for more information.

5.6.2 Specific Requirements

The laboratory retains all pertinent information for standards, reagents, and chemicals to ensure that calibrations and measurements are traceable to a national standard. This includes documentation of purchase, receipt, preparation, and use. If traceability of measurements to a national standard is not possible or not relevant, evidence for correlation of results through inter-laboratory comparisons, proficiency testing, or independent analysis is provided.

5.6.3 Reference Standards and Reference Materials

Reference standards and materials are used to derive the laboratory's analytical measurements; therefore, it is essential that the reference standards and materials used are of very high quality.

5.6.3.1 Reference Standards

The laboratory uses ASTM Class 1 reference weights and NIST traceable reference thermometers which are calibrated and/or verified for accuracy by an ISO 17025 (or equivalent) accredited vendor that can provide traceability to national or international standards at a minimum frequency of every 5 years. All working thermometers are calibrated or verified at least annually using a NIST traceable thermometer.

5.6.3.2 Reference Materials

Whenever possible, reference materials must be purchased from a vendor that is accredited to ISO 17034 or Guide 34. Purchased reference materials require a Certificate of Analysis (COA) where available. If a reference material cannot be purchased with a Certificate of Analysis (COA), it must be verified by analysis and comparison to a certified reference material and/or there must be a demonstration of capability for characterization.

Upon receipt, all purchased reference material standards are recorded into a database and are assigned a unique identification number. Theses entries include

the chemical name, manufacturer name, manufacturer's identification numbers, receipt date, and expiration date. The vendor's certificates of analysis for all standards, reagents, or chemicals are retained for future reference.

Subsequent preparations of intermediate or working solutions are also recorded and given unique identification numbers. These entries include the stock standard identification, the solvent identification used for preparation, method of preparation, preparation date, expiration date, and the preparer's initials. The unique identification numbers of the reference material standards are used in any applicable sample preparation or analysis records so the standard can be traced back to the standard preparation record. This process ensures traceability back to the national standard.

5.6.3.3 Intermediate Checks

Reference material standards used for instrument calibration are verified by using a second source of the material. The second source materials are from a different manufacturer or different lot from the same manufacturer. Reference material standards are checked frequently and replaced if degradation or evaporation is suspected.

The laboratory also provides satisfactory evidence of correlation of results by participation in a suitable program of inter-laboratory comparisons or proficiency testing whenever possible.

5.6.3.4 Transport and Storage

The laboratory handles and transports reference standards and materials in a manner that protects the integrity of the materials. Reference standard and material integrity is protected by separation from incompatible materials and/or minimizing exposure to degrading environments or materials. Standards and reference materials are stored separately from samples, extracts, and digestates. All standards are stored according to the manufacturer's recommended conditions. Temperatures colder than the manufacturer's recommendation are acceptable if it does not compromise the integrity of the material (e.g. remains in liquid state and does not freeze solid). In the event a standard is made from more than a single source with different storage conditions, the standard will be stored according to the conditions specified in the analytical method.

See the applicable analytical SOPs for specific reference material storage protocols.

5.6.3.5 Documentation and Labeling

The laboratory retains records for all standards, reagents, and reference materials. These records include the manufacturer/vendor, the manufacturer's Certificate of Analysis or purity (if available), the date of receipt, and recommended storage conditions. These records also include manufacturer lot numbers when applicable.

For the original containers, the expiration date provided by the manufacturer is recorded on the container if the expiration date is not already present. If an expiration date is not provided then no expiration date labeling is required.

All prepared standard or reagent containers include the laboratory's unique identification number, the standard or chemical name, the date of preparation, the date of expiration, and the preparer's initials. For containers that are too small to accommodate labels that list all of the above information associated with a standard, the minimum required information will be the laboratory's unique identification number and expiration date. This assures that no standard will be used past its assigned expiration date.

Standards, reference materials, and reagents are not used after their expiration dates unless their reliability is thoroughly documented and verified by the laboratory. If a standard exceeds its expiration date and is not re-certified, the laboratory removes the standard and/or clearly designates it as acceptable for qualitative/troubleshooting purposes only. All prepared standards, reference materials, and reagents are verified to meet the requirements of the test method through routine analyses of quality control samples.

5.7 SAMPLING

5.7.1 Sampling Plans and Procedures

Sampling plans and written sampling procedures are used for sampling substances, materials, or products for testing. The sampling plans and procedures are made available at the sampling location. Sampling plans are, whenever reasonable, based on appropriate governing methods. The sampling process addresses the factors to be controlled to ensure the validity of the analytical results.

See Appendix III of this document for more information regarding field sampling protocols.

5.7.2 Customer Requested Deviations

When the customer requires deviations, additions, or exclusions from the documented laboratory sampling plan and/or procedure, these are recorded in

detail with the appropriate sampling data and are included in the final report. These deviations are also communicated to the appropriate laboratory personnel.

5.7.3 Sampling Records

Sampling records are maintained that include the sampling procedure used, any deviations from the procedure, the date and time of sampling, the identification of the sampler, environmental conditions (if relevant), and the sampling location.

See Appendix III of this document for more information regarding field sampling protocols.

5.7.4 Laboratory Subsampling

In order for analysis results to be representative of the sample collected in the field, the laboratory has subsampling procedures. For more information see SOP #030220, *Sample Homogenization*.

5.8 SAMPLE MANAGEMENT

5.8.1 Sample Management Procedures

Procedures have been established for the transportation, receipt, handling, protection, storage, retention, and disposal of samples. These procedures include provisions necessary to protect the integrity of the samples, and to protect the interests of the laboratory and our customers. For more information see the following SOPs; 060105 *Sample Receiving*, 060106 *Sample Storage and Disposal*, 060108 *Return Sample Shipping*, 060110 *Sample Shipping*, and 060112 *Cold Storage Management*.

5.8.1.1 Chain of Custody

A chain of custody (COC) provides documentation of the possession of samples from time of collection to receipt in the laboratory. This record generally includes: the number and types of containers; the mode of collection; the collector; time of collection; preservation; and requested analyses.

Laboratory field personnel or customer representatives must complete a chain of custody for all samples that are received by the laboratory. The importance of complete chain of custody records is stressed to the samplers and is critical to insure the requested methods are used to analyze the correct samples. If sample shipments are not accompanied by complete chain of custody records, then Sample Receiving personnel will notify applicable personnel in Customer Services. Customer services then obtains the correct documentation/information from the customer in order for the analysis of samples to proceed.

Chain of custody records are filled out completely and legibly with indelible ink. Errors are corrected by drawing a single line through the initial entry and initialing and dating the change. All transfers of samples are recorded on the chain of custody in the "relinquished and "received by sections.

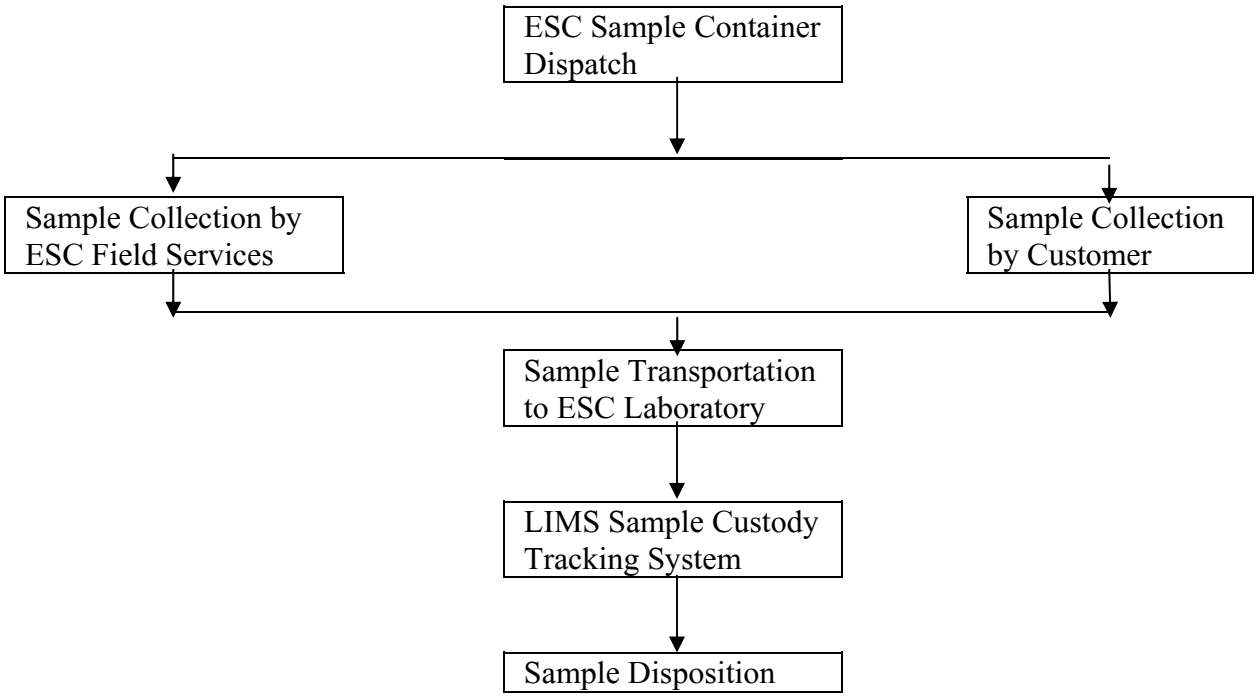
5.8.1.2 Legal Chain of Custody

Legal chain of custody procedures are performed at the special request of the customer, or if there are program requirements that mandate these procedures.

The legal chain of custody (COC) protocol establishes an intact, continuous record of the physical possession, storage, and disposal of samples. This includes the collected samples, sample aliquots, and sample extracts/digestates. Legal COC records account for all time periods associated with the samples, and identifies all individuals who physically handled individual samples. Legal COC shall begin at the point established by the federal or state oversight program. This may begin at the point that cleaned sample containers are provided by the laboratory or the time sample collection occurs.

Figure 5.8.1 below represents a flow diagram of the legal chain of custody process.

FIGURE 5.8.1
LEGAL CHAIN OF CUSTODY PROCESS



5.8.2 Sample Identification and Labeling

A unique sample identification number is generated for each sample submitted to the laboratory and is used throughout the analytical and disposal cycle. A record of all samples is established and maintained.

Each sample is assigned a unique and consecutive log number. After a sample is entered into the Laboratory Information Management System (LIMS) database it is assigned a specific log number identifier. The LIMS automatically assigns the next consecutive number any subsequent samples. Log numbers are not available for reuse and cannot be altered.

A durable laboratory sample label with the log number is printed from LIMS and is affixed to the sample. Each label contains a unique container ID, represents the sample ID number, and is clearly marked with preservative and requested analysis.

5.8.3 Sample Receipt, Inspection, and Login

Upon receipt of samples, departures from method or regulatory specified conditions are recorded. When these departures occur, the laboratory contacts the customer for further instructions before proceeding with the analysis. Records of these discussions are maintained.

5.8.3.1 Sample Acceptance Policy

In accordance with regulatory guidelines, ESC Lab Sciences complies with the following sample acceptance policy for all samples received.

If the samples do not meet the sample receipt acceptance criteria outlined below, the laboratory is required to document all non-compliances, contact the customer, and either reject the samples or fully document any decisions to proceed with analyses of samples which do not meet the criteria. Any results reported from samples not meeting these criteria are appropriately qualified on the final report.

All samples must:

- Have unique client identification that are clearly marked with durable waterproof labels on the sample containers and that match the chain of custody.
- Have clear documentation on the chain of custody related to the location of the sampling site with the time and date of sample collection.
- Have all requested analyses clearly designated on the COC.
- Be in appropriate sample containers with clear documentation of the preservatives used.
- Be correctly preserved unless the method allows for laboratory preservation.

- Be received within holding time. Any samples with hold times that are exceeded will not be processed without prior customer approval.
- Have sufficient sample volume to proceed with the analytical testing. If insufficient sample volume is received, analysis will not proceed without customer approval.
- Be received within appropriate temperature ranges (not frozen but ≤6°C) unless program requirements or customer contractual obligations mandate otherwise. The cooler temperature is recorded directly on the COC. Samples that are delivered to the laboratory immediately after collection are considered acceptable if there is evidence that the chilling process has been started. For example, by the arrival of the samples on ice. If samples arrive that are not compliant with these temperature requirements, the customer will be notified. The analysis will NOT proceed unless otherwise directed by the customer. If less than 72 hours remain in the hold time for the analysis, the analysis may be started while the customer is contacted to avoid missing the hold time. Data associated with any deviations from the above sample acceptance policy requirements will be appropriately qualified.

Samples for drinking water analysis that are improperly preserved, or are received past holding time, are rejected at the time of receipt, with the exception of VOA samples that are tested for pH at the time of analysis.

5.8.3.2 Sample Receipt and Inspection

All samples are verified upon receipt as meeting its description and being free from damage. In the event of a sample being lost, damaged or otherwise unsuitable for use, full details of the incident are recorded and reported to the customer by the Technical Service Representative via a nonconformance form, prior to any analytical action being taken. Any further action taken is at the direction of the customer.

Login Technicians are responsible for sample login and assessing sample container integrity, documentation, and identification. Samples are inspected and noted for temperature, pH using narrow-range pH paper, headspace, proper container type, container integrity (broken or leaking), and volume levels. Samples requiring thermal preservation at 4°C must arrive at the laboratory above freezing but ≤6°C. If the samples are not appropriately preserved, the problem is noted on a sample nonconformance form, the customer is notified, and, if the lab is instructed to proceed, proper preservation is performed. The sample nonconformance sheet becomes a permanent part of the COC. Samples, which require refrigeration, are placed in a laboratory cooler immediately after login.

Login Technicians are trained to recognize analyses with immediate, 24-hour, and 48-hour holding times. Those samples are designated as “short-holds . When

short-hold samples arrive at the laboratory, the Login procedure for those samples takes place immediately. All analysts are trained to assess incoming samples for holding time limitations.

If a sample has a holding time limitation, the LIMS issues a due date on the bench sheet to ensure that the extraction or analysis is completed within the time allowed. In the event that a holding time is exceeded, the TSR contacts the customer, informs them of the situation, and requests further direction. If instructed by the customer to proceed with the analysis, a qualifier is added to the benchsheet, which is then carried on to reporting. The final report bears the explanation in the form of a qualifier.

5.8.3.3 Nonconformance Issues

- If there are problems with the samples, the event details are documented on the sample nonconformance form/COC; then, the sampler and/or customer is notified.
- If the customer insists on proceeding with analyses, even with full knowledge of the possible invalidity of the sample, a qualifier detailing the problem is added in the LIMS and it is also noted on the nonconformance form.
- The TSR, affected chemists, and reporting personnel are also notified.

5.8.3.4 Sample Login

After sample inspection, all sample information on the chain of custody is entered into the Laboratory Information Management System (LIMS). This permanent record documents receipt of all sample containers including:

- Customer name and contact information
- The laboratory's unique sample identification numbers
- Sample descriptions
- Due dates
- List of analyses requested
- Date and time of laboratory receipt
- Field ID code
- Date and time of collection
- Any comments resulting from inspection for sample rejection

5.8.4 Sample Storage and Protection

The samples are stored according to method and regulatory requirements as per the applicable analytical SOPs. While in storage, samples are stored by sample ID and analyses required. Samples are stored away from all standards, reagents, or other potential sources of contamination. Samples are stored in a manner that

prevents cross contamination. Volatile samples are stored separately from other samples. All sample fractions, extracts, leachates, and other sample preparation products are stored in the same manner as actual samples or as specified by the analytical method.

Refrigerated storage areas are maintained at ≤6°C (but not frozen) and freezer storage areas are maintained at <-10°C (unless otherwise required per method or program). The temperature of each storage area is checked and documented at least once for each day of use. If the temperature falls outside the acceptable limits, then corrective actions are taken and appropriately documented.

The laboratory is operated under controlled access protocols to ensure sample and data integrity. Visitors must register at the front desk and be properly escorted at all times. Samples are taken to the appropriate storage location immediately after sample receipt and login procedures are completed. All sample storage areas have limited access. Samples are removed from storage areas by designated personnel and returned to the storage areas as soon as possible after the required sample quantity has been taken.

5.8.4.1 Sample Retention and Disposal

Samples, extracts, digestates, and leachates are retained by the laboratory for the period of time necessary to protect the interests of the laboratory and the customer. Unused portions of samples are retained by the laboratory based on program or customer requirements for sample retention and storage. The minimum sample retention time is 45 days after sample receipt. Samples may be stored at ambient temperature when all analyses are complete, the hold time is expired, the report has been delivered, and/or allowed by the customer or program. Samples requiring storage beyond the minimum sample retention time due to special requests or contractual obligations may be stored at ambient temperature unless the laboratory has sufficient capacity and their presence does not compromise the integrity of other samples.

After this period expires, non-hazardous samples are properly disposed of as non-hazardous waste. The preferred method for disposition of hazardous samples is to return the excess sample to the customer. If it is not feasible to return samples, or the customer requires the laboratory to dispose of excess samples, proper arrangements will be made for disposal by an approved contractor.

For more information about sample storage and disposal see Section 6 of this document, SOP #060106, *Sample Storage and Disposal*, and SOP #060112, *Cold Storage Management*.

5.9 QUALITY CONTROL

5.9.1 Quality Control Procedures

ESC Lab Sciences has established quality control procedures for monitoring the validity of the testing it performs. Quality control samples are processed in the same manner as customer samples. The quality control results are recorded in such a way that trends are detectable, and where practicable, are statistically evaluated. This monitoring is planned and reviewed, and includes the utilization of certified reference materials (where available), participation in proficiency testing programs, replicate or confirmation analyses, correlation of results from related analyses, comparison to historical data, etc.

5.9.2 Quality Control Evaluation

The quality control data is evaluated and, when found to be outside pre-defined criteria, action is taken to correct the problem and to prevent incorrect results from being reported. For more information see the applicable analytical SOPs.

5.9.3 Essential Quality Control Procedures

Below are some general essential quality control procedures used in the laboratory. Additional information can be found in the applicable analytical SOPs.

5.9.3.1 Initial Calibration Verification (ICV) or Second Source Verification (SSV)

It is possible for a calibration curve to meet method criteria but still not have the ability to obtain accurate results because all calibration points are from the same source. To assess the accuracy of new calibration curves relative to the purity of the standards, a single standard from a secondary source is analyzed. This secondary source must be from an alternative vendor or from a different lot if the same vendor is used for the preparation of the calibration standards. The laboratory follows specific guidelines for ICV/SSV recoveries and further information can be found in the applicable laboratory SOP.

5.9.3.2 Continuing Calibration Verification (CCV)

Analytical instrumentation is checked periodically to determine if the analytical response has changed significantly since the initial calibration was established. The values obtained from the analysis of the CCV are compared to the true values and a percent change calculated. The laboratory follows specific guidelines for CCV frequency and recoveries. Further information can be found in the applicable laboratory SOP.

5.9.3.3 Method Blank

A method blank is used to evaluate contamination in the preparation/analysis system and is processed through all preparation and analytical steps with its associated samples. A method blank is processed at a minimum frequency of one per batch of up to twenty samples.

The method blank consists of a matrix similar to the associated samples that is known to be free of analytes of interest. Method blanks are not applicable for certain analyses, such as pH, conductivity, flash point and temperature.

Each method blank is evaluated for contamination. The source of any contamination is investigated and documented corrective action is taken when the concentration of any target analyte is detected above the reporting limit and is greater than 1/10 of the amount of that analyte found in any associated sample. Some programs may require evaluating their method blanks down to ½ the reporting limit as opposed to the reporting limit itself. Corrective actions for blank contamination may include the re-preparation and re-analysis of all samples (where possible) and quality control samples. Data qualifiers must be applied to results that are considered affected by contamination in a method blank.

5.9.3.4 Laboratory Control Sample

The Laboratory Control Sample (LCS) is used to evaluate the performance of the entire analytical system including preparation and analysis. An LCS is processed at a minimum frequency of one per batch of up to twenty samples.

The LCS consists of a matrix similar to the associated samples that is known to be free of the analytes of interest that is then spiked with known concentrations of target analytes. An LCS is not applicable for certain analyses where spiking procedures are not practical such as dissolved oxygen, odor, and temperature.

The LCS is evaluated against the method default or laboratory-derived acceptance criteria. Any compound that is outside of these limits is considered to be 'out of control' and must be qualified appropriately. Any associated sample containing an 'out-of-control' compound must either be re-analyzed with a successful LCS or reported with the appropriate data qualifier. An exception to this is when the acceptance criteria for the LCS are exceeded high and there are associated samples that are non-detects, then those non-detects can be reported. Another exception is when the acceptance criteria are exceeded low, those associated sample results may be reported if they exceed the maximum regulatory limit or decision level.

For LCSs containing a large number of analytes, it is statistically likely that a few recoveries will be outside of control limits. This does not necessarily mean that the

system is out of control, and therefore no corrective action would be necessary (except for proper documentation). TNI has allowed for a minimum number of marginal exceedances, defined as recoveries that are beyond the LCS control limits (3X the standard deviation) but less than the marginal exceedance limits (4X the standard deviation). The number of allowable exceedances depends on the number of compounds in the LCS. If more analyte recoveries exceed the LCS control limits than is allowed (see below) or if any one analyte exceeds the marginal exceedance limits, then the LCS is considered non-compliant and corrective actions are necessary. The number of allowable exceedances is as follows:

Number of Target Analytes	**Allowable Marginal Exceedance Outliers**
>90	5 analytes allowed in the ME limit
71-90	4 analytes allowed in the ME limit
51-70	3 analytes allowed in the ME limit
31-50	2 analytes allowed in the ME limit
11-30	1 analytes allowed in the ME limit
<10	0 analytes allowed in the ME limit

5.9.3.5 Matrix Spike

A matrix spike (MS) is used to determine the effect of the sample matrix on compound recovery for a particular method. The information from these spikes is sample or matrix specific and is not used to determine the acceptance of an entire batch. A MS consists of the sample matrix that is then spiked with known concentrations of target analytes.

A Matrix Spike/Matrix Spike Duplicate (MS/MSD) set is processed at a frequency specified in the applicable laboratory SOP or as determined by a specific customer request. Typically, an MS/MSD set is analyzed once per batch of up to twenty samples.

The MS/MSD set is evaluated against the method or laboratory derived criteria. Any compound that is outside of these limits is considered to be 'out of control' and must be qualified appropriately. Batch acceptance, however, is based on method blank and LCS performance, not on MS/MSD recoveries. The spike recoveries give the data user a better understanding of the final results based on their site specific information.

5.9.3.6 Sample Duplicate

A sample duplicate is a second portion of sample that is prepared and analyzed in the laboratory along with the first portion. It is used to measure the precision associated with preparation and analysis. A sample duplicate is processed at a

frequency specified by the particular method or as determined by a specific customer.

The sample and duplicate are evaluated against the method or laboratory derived criteria for relative percent difference (RPD). Any duplicate that is outside of these limits is considered to be 'out of control' and must be qualified appropriately.

5.9.3.7 Surrogates

Surrogates are compounds that reflect the chemistry of target analytes, but are not expected to occur naturally in field samples. The purpose of the surrogates is to assess sample preparation, analytical efficiency, and to monitor the effect of the sample matrix on compound recovery.

The surrogates are evaluated against the method or laboratory derived acceptance criteria or against project-specific acceptance criteria specified by the customer. Any surrogate compound that is outside of these limits is considered to be 'out of control' and must be qualified appropriately. Samples with surrogate failures can be re-extracted and/or re-analyzed to confirm that the out-of-control value was caused by the matrix of the sample and not by some other systematic error.

5.9.3.8 Internal Standards

Internal Standards are compounds not expected to occur naturally in field samples. They are added to every standard and sample at a known concentration prior to analysis for the purpose of adjusting the response factor used in quantifying target analytes. The laboratory follows specific guidelines for the treatment of internal standard recoveries and further information can be found in the applicable laboratory SOP.

5.9.3.9 Proficiency Testing (PT) Studies

The laboratory participates in proficiency testing programs. PT samples are obtained from approved providers and analyzed and reported at a minimum of two times per year for the relevant fields of testing per matrix. PT samples are treated as typical customer samples. They are included in the laboratory's normal analytical processes and do not receive extraordinary attention due to their nature.

The laboratory does not share PT samples with other laboratories, does not communicate with other laboratories regarding current PT sample results, and does not attempt to obtain the assigned value of any PT sample from the PT provider.

The laboratory initiates an investigation and corrective action plan whenever PT results are deemed unacceptable by the PT provider. Additional PTs will be analyzed and reported as needed for certification purposes.

Additional information can be found in the SOP# 030212, *Proficiency Testing Program*

5.10 DATA REPORTING

5.10.1 General

The results of each analysis carried out by the laboratory are reported accurately, clearly, unambiguously, objectively, and in accordance with any specific instructions in regulatory requirements, analytical method(s), and/or laboratory standard operating procedures. The analytical data is reported in an analytical report that is issued to the customer. Analytical reports include all information requested by the customer, any necessary information for the interpretation of the results, and all information required by the analytical method(s) used.

Final reports are prepared according to the level of reporting required by the customer and can be transmitted to the customer via hardcopy and/or electronic data deliverables.

5.10.2 Analytical Reports

In the case of a written agreement with the customer, the analytical results may be reported in a non-standard way. In these cases, all information contained in the standard analytical reports is maintained by the laboratory and is readily available.

Standard analytical reports contain the following information:

- A title (e.g. Analytical Report)
- ESC Lab Sciences name and address
- Telephone number and name of a laboratory contact to where questions can be referred
- A unique identification number for the report. The pages of the report are numbered and a total number of pages are indicated.
- Name and address of the customer
- Identification of the analytical methods used
- The unique laboratory's identification of the samples analyzed as well as customer's identification of the samples
- The condition of the samples received and the identification of any sample that did not meet acceptable sampling requirements such as improper sample containers, holding times missed, sample temperature, etc.
- Dates and times of sample collection, sample receipt by the laboratory, sample preparation, and sample analysis
- Reference to the sampling plan and sampling procedures used if sampling was conducted by the laboratory

- The analytical results with the units of measurement and reporting limits.
- The name, title, and signature of the person authorizing the analytical report
- A statement about the results relate only to the items tested
- Deviations from the analytical methods. These can include failed quality control parameters, deviations caused by the matrix of the sample, etc. This can be part of the case narrative or as defined footnotes to the analytical data.
- For Whole Effluent Toxicity, identification of the statistical method used to provide data
- Date report was issued
- For solid samples, identification of whether results are on a dry weight or wet weight basis
- Identification of all test results provided by a subcontracted laboratory or other outside source
- Any non-accredited tests are identified as such
- Identification of results obtained outside of quantitation levels
- In conjunction with Ohio VAP projects, a signed affidavit is also required.

5.10.3 Additional Analytical Report Items

In addition to the requirements listed above, final reports also contain the following items when necessary for the interpretation of results:

- Deviations from, additions to, or exclusions from the analytical method(s) used. Also where relevant, information on specific analytical conditions such as environmental conditions
- Where relevant, a statement of compliance/non-compliance with requirements and/or specifications (e.g. TNI Standard)
- Where applicable, a statement on the estimated uncertainty of measurement; information on uncertainty is needed in test reports when it is relevant to the validity or application of the test results, when a customer's instruction so requires, or when the uncertainty affects compliance to a specification limit;
- Where appropriate and needed, opinions and interpretations (see section 5.10.5 below)

In addition to the requirements listed above, analytical reports containing the results of samples collected by the laboratory include the following, where necessary for the interpretation of test results:

- The date of sampling
- Unambiguous identification of the substance, material or product sampled
- The location of sampling, including any diagrams, sketches or photographs
- A reference to the sampling plan and procedures used

- Details of any environmental conditions during sampling that may affect the interpretation of the test results
- Any standard or other specification for the sampling method or procedure, and deviations, additions to or exclusions from the specification concerned.

5.10.4 Calibration Certificates

ESC Lab Sciences is an analytical laboratory that does not perform calibration activities for customers; therefore, no calibration certificates are issued to customers.

5.10.5 Opinions and Interpretations

When opinions and interpretations are included in the analytical reports, the laboratory documents the basis upon which the opinions and interpretations have been made. These may include opinions on the compliance/non-compliance of the results with regulatory requirements, fulfillment of contractual requirements, and recommendations on how to use the results. Opinions and interpretations are clearly marked as such in the analytical report and are contained in the case narrative.

5.10.6 Results from Subcontractors

When the analytical reports contain results of tests performed by subcontractors, these results are clearly identified. When analytical work has been subcontracted, the subcontracted laboratory issues analytical reports to ESC Lab Sciences in writing and/or electronically. Copies of analytical reports from subcontracted laboratories are made available to customers.

5.10.7 Electronic Transmission of Results

Customer data that requires transmission by electronic means undergoes appropriate steps to include all the required reporting information and to adequately maintain data integrity and confidentiality.

5.10.8 Format of Analytical Reports

The format of the laboratory's analytical reports are designed to accommodate each type of analytical test carried out by the laboratory and to minimize the possibility of misunderstanding or misuse of analytical results.

5.10.9 Amendments to Analytical Reports

Analytical reports that are amended after issue to the customer are clearly identified as such and include a reference to the original report. This process is described in SOP 030223, *Report Revision*.

6.0 WASTE MINIMIZATION/DISPOSAL AND REAGENT STORAGE

ESC's sample disposal policy is founded on RCRA [40 CFR Part 261.4 (d)] and CWA [40 CFR Part 403 (Pretreatment)]. Part 261.4 (Figure 6.4) excludes a sample of waste while it is a sample; however, once no longer fitting the description of a sample, it becomes waste again. The policy is further strengthened by information found in "Less is Better" published by the ACS and developed by the ACS Task Force on RCRA.

The EPA requires that laboratory waste management practice to be conducted consistent with all applicable rules and regulations. Excess reagents, samples and method process wastes must be characterized and disposed of in an acceptable manner. Refer to ESC SOP #030309, *Waste Management Plan* for detailed information.

6.1 QUARANTINED SOIL SAMPLES

ESC maintains a permit to receive and analyze soils from foreign or quarantined areas. All non-hazardous soil samples are disposed of as originating from a quarantined area. All unconsumed soil samples and containers are sterilized in accordance with the current USDA regulations found in 7 CFR 301.81. Both container and contents are dry-heated at 450°F for two minutes, then crushed prior to disposal into a sanitary landfill. For further information refer to SOP# 030309, *Waste Management Plan*.

6.2 MOLD/BIOHAZARD SAMPLE DISPOSAL

The laboratory has contracted a local licensed medical waste removal and disposal firm to remove all biohazard and medical waste generated by the laboratory. All waste arriving at the treatment facility is incinerated or steam sterilized complying with all Federal, State, County and local rules, regulations and ordinances. The medical waste containers are picked up at least weekly and confirmation records are available in the laboratory.

All wastes classified as non-biohazard are disposed of via the sanitary sewer following treatment with a disinfectant, such as Chlorox (hypochlorite). The disinfectant and waste liquid is one part disinfectant and five parts waste liquid. Waste disposal records indicating the disposal method are available in the laboratory.

6.3 REAGENTS, STORAGE AND WASTE DISPOSAL

6.3.1 Reagents:

- All chemicals are at least ACS reagent-grade or better.
- All reagents and chemicals are checked for quality, purity and acceptability upon arrival in the laboratory.
- Each chemical container displays the following information: date opened and the expiration date.

- All reagent solutions prepared in-house are documented in Standards Logger and labels contain the following information: unique ESC identifier, date prepared, analyst initials, expiration date, and reagent name. In house reagents are recorded with the same information in Standards Logger.
- Purchased reagent solutions are labeled with a unique identifier assigned in Standards Logger when received, opened and with the expiration date.

6.3.2 Storage:

- Reagents requiring refrigeration are stored in the area of use in a suitable refrigerated storage that is separate from field sample storage.
- Reagents and standards used for volatile organic analysis are stored in a separate refrigerator and are not stored with field samples.
- See the following table for more information regarding reagent storage.

Item	**Reagent Storage**
Acids	Designated acid storage cabinets, in original container.
Organic Reagents - Flammables	Stored in flammables cabinet on separate air handling system from volatiles analysis.
Liquid Bases	Stored in designated cabinet, away from acids.
Solid Reagents	General cabinet storage.
Refrigerated Aqueous Reagents/Standards	Stored in walk-in cooler on designated shelves, away from field samples.
Stable Standard Solutions	Storage cabinet designated in each laboratory for standards.
Dehydrated Media	Dehydrated media is stored at an even temperature in a cool dry place away from direct sunlight. Media is discarded if it begins to cake, discolor, or show signs of deterioration. If the manufacturer establishes an expiration date, the media is discarded after that date. The time limit for unopened bottles is 2 years at room temperature. Where needed comparisons of recovery of newly purchased lots of media against proven lots, using recent pure-culture isolates and natural samples, are performed.
Pure Biological Cultures	All organisms are stored on Tryptic Soy Agar at 4°C in a dedicated refrigerator located in the biology department

6.3.3 Disposal:

- All excess, out of date or unneeded chemicals, reagents and standards are sent to the ESSH Office to ensure proper disposal. Excess chemicals designated as hazardous waste are lab packed and disposed of according to local, State and Federal regulations. Final disposal method is dependant on the classification of each individual chemical. Some sample extracts, chemicals or standards designated as hazardous waste may be disposed of into appropriate satellite accumulation areas.

Any additional EPA waste codes resulting from addition of standard are applied to the satellite container, if applicable.

- ESSH prohibits the sink disposal of chemicals, the intentional release of chemicals through chemical fume hoods and mixing of nonhazardous lab trash with hazardous waste.
- Sample and reagent/solvent disposal is handled in different ways according to toxicity.
  - Solvents, reagents, samples and wastes are segregated according to base/acid, reactive/non-reactive, flammable/non-flammable, hazardous/non-hazardous, soil/liquid etc. Samples are grouped together relevant to these categories and are disposed of accordingly.
  - Table 6.3 lists waste disposal methods for various test by-products.
- Upon receipt and login, each sample is coded by sample matrix type. The codes divide samples into the following groups: air, industrial hygiene, wastewater, cake sludge, soil, drinking water and miscellaneous. As laboratory personnel review the data reported, the method of disposal is also determined.
- The TSR is notified if samples are to be returned to the customer.

6.4 CONTAMINATION CONTROL

6.4.1 VOCs

The VOC Lab is physically separated from the Extraction Laboratory in order to eliminate contamination caused by the use of extraction solvents. Contamination is monitored daily through the use of instrument/method blanks. Refrigerator blanks are also used to ensure that cross contamination does not occur during volatile field sample storage.

6.4.2 Biological Lab

The aquatic toxicity testing, mold testing, and all other biological determinations are performed in the administrative building and are therefore physically separated from processes involving solvent or other chemical use that could negatively impact biological organisms. The mold lab conducts monthly analyses to ensure that the laboratory environment is contaminant free. All critical areas are included and a record is kept of the sampling plan (including locations) and results.

TABLE 6.4 - WASTE DISPOSAL

NOTE: This information is a general guide and is not intended to be inclusive of all waste or hazardous samples.

PARAMETER	WASTE PRODUCTS	WASTE CLASSIFICATION	DISPOSAL METHOD
Acidity	slightly alkaline water	none	neutralize-sanitary sewer
Alkalinity	slightly acidic	none	neutralize-sanitary sewer
BOD, 5-day	Sample waste only	none	sanitary sewer
COD	acid waste, Hg, Ag, Cr+6	corrosive, toxic	dispose via haz waste regulations
Conductivity	Sample waste only	none	sanitary sewer
Cyanide, Total	acidic waste	corrosive	neutralize-sanitary sewer
Cyanide, Amenable	acidic waste	corrosive	neutralize-sanitary sewer
Flashpoint	Misc. Organic waste containing Chlorobenzene	Flammable	Dispose via haz waste regulations
Hardness, Total	pH 10.0 alkaline waste	none	neutralize-sanitary sewer
Extraction/prep	methylene chloride and hexane	toxic solvents	Reclaim for resale
Methylene Blue Active Sub.	Acidic Chloroform Waste	toxic & acidic	dispose via haz waste regulations
Nitrogen-Ammonia	alkaline liquids	corrosive	neutralize-sanitary sewer
Nitrogen-Total Kjeldahl	Trace Hg in alkaline liquid	corrosive toxic	neutralize-sanitary sewer
Nitrogen-Nitrate, Nitrite	mild alkaline waste	none	sanitary sewer
Oil & Grease and Petroleum/Mineral Oil & Grease	Hexane	Toxic solvent	dispose via haz waste regulations
pH	Sample waste only	none	sanitary sewer
Phenols	slightly alkaline, non-amenable CN-	none	sanitary sewer
Phosphate-Total and Ortho	combined reagent	listed	sanitary sewer
Reactive CN & S	Acidic waste	corrosive	Neutralize - sanitary sewer; waste is monitored for CN
Solids, Total/ Suspended/Dissolved	Sample waste only	none	sanitary sewer
Turbidity	Sample waste only	none	sanitary sewer
Metals	acids, metal solutions	corrosive, toxic	highly toxic metal standards and samples - dispose via haz waste regulations
Volatile Organics	methanol	toxic solvents	dispose via haz waste regulations
Extractable Organics	solvents, standards	toxic solvents	dispose via haz waste regulations
Biological Non-biohazardous Waste	Gloves, plastic containers	none	Standard refuse

40 CFR PART 261-IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

Subpart A-General Sec.

261.1 Purpose and scope.
261.2 Definition of solid waste.
261.3 Definition of hazardous waste.

261.4 Exclusions.
261.5 Special requirements for hazardous waste generated by conditionally exempt small quantity generators.
261.6 Requirements for recyclable materials.
261.7 Residues of hazardous waste in empty containers.
261.8 PCB wastes regulated under Toxic Substance Control Act.
261.9 Requirements for Universal Waste.

Sec.261.4 Exclusions.
(d) *Samples.* (1) Except as provided in paragraph (d)(2) of this section, a sample of solid waste or a sample of water, soil, or air, which is collected for the sole purpose of testing to determine its characteristics or composition, is not subject to any requirements of this part or parts 262 through 268 or part 270 or part 124 of this chapter or to the notification requirements of section 3010 of RCRA, when:

(i) The sample is being transported to a laboratory for the purpose of testing; or
(ii) The sample is being transported back to the sample collector after testing; or
(iii) The sample is being stored by the sample collector before transport to a laboratory for testing; or
(iv) The sample is being stored in a laboratory before testing; or
(v) The sample is being stored in a laboratory after testing but before it is returned to the sample collector; or
(vi) The sample is being stored temporarily in the laboratory after testing for a specific purpose (for example, until conclusion of a court case or enforcement action where further testing of the sample may be necessary).
(2) In order to qualify for the exemption in paragraphs (d)(1) (i) and (ii) of this section, a sample collector shipping samples to a laboratory and a laboratory returning samples to a sample collector must:
(i) Comply with U.S. Department of Transportation (DOT), U.S. Postal Service (USPS), or any other applicable shipping requirements; or
(ii) Comply with the following requirements if the sample collector determines that DOT, USPS, or other shipping requirements do not apply to the shipment of the sample:
(A) Assure that the following information accompanies the sample:
(*1*) The sample collector's name, mailing address, and telephone number;
(*2*) The laboratory's name, mailing address, and telephone number;
(*3*) The quantity of the sample;
(*4*) The date of shipment; and
(*5*) A description of the sample.
(B) Package the sample so that it does not leak, spill, or vaporize from its packaging.
(3) This exemption does not apply if the laboratory determines that the waste is hazardous but the laboratory is no longer meeting any of the conditions stated in paragraph (d)(1) of this section.

7.0 Common Calculations

- Percent Recovery (%REC)

$$\%REC = \frac{(MeasuredValue - SampleConc)}{TrueValue} * 100$$

where:
TrueValue = Amount spiked
MeasuredValue = Amount measured
SampleConc = Amount measured in source sample (Used for %REC in MS calculations)
NOTE: The SampleConc is zero (0) for LCS and Surrogate Calculations

- Relative Percent Difference (RPD)

$$RPD = \frac{|(R1 - R2)|}{(R1 + R2)/2} * 100$$

where:
R1 = Result of Sample 1
R2 = Result of Sample 2

- Percent Difference (%D)

$$\%D = \frac{MeasuredValue - TrueValue}{TrueValue} * 100$$

where:
TrueValue = Amount spiked (can also be the CF or RF of the ICAL Standards)
Measured Value = Amount measured (can also be the CF or RF of the CCV)

- Percent Drift

$$\%Drift = \frac{CalculatedConcentration - TheoreticalConcentration}{TheoreticalConcentrtion} * 100$$

- Average

$$Average = \frac{\sum_{n=1}^{i} X_i}{n}$$

where:
n = number of data points
X_i = individual data point

- Calibration Factor (CF)

$$CF = \frac{A_s}{C_s}$$

where:
A_s = Average Peak Area over the number of peaks used for quantitation
C_s = Concentration of the analyte in the standard.

- Response Factor (RF)

$$RF = \frac{(Conc._{IStd})(Area_{Analyte})}{(Conc._{analyte})(Area_{IStd})}$$

where:
A_s = Response for analyte to be measured
A_{is} = Response for the internal standard
C_{is} = Concentration of the internal standard
C_s = Concentration of the analyte to be measured

- Standard Deviation (S)

$$S = \sqrt{\sum_{i=1}^{n} \frac{(X_i - X_{ave})^2}{(n-1)}}$$

where:
n = number of data points
X_i = individual data point
X_{ave} = average of all data points

- Relative Standard Deviation (RSD)

$$RSD = \frac{S}{X_{ave}} * 100$$

where:
S = Standard Deviation of the data points
X_{ave} = average of all data points

- Minimum Detectable Activity (MDA)

  The MDA is used for radiological analysis and is calculated with the following equations:

  MDA with Blank Population

$$MDA = \frac{3.29 \times S_b}{KT_s} + \frac{3}{KT_s}$$

  Where:
  K = E × V × R × Y × F × 2.22
  E = efficiency
  V = sample volume
  R = tracer recovery
  Y = gravimetric carrier recovery
  F = ingrowth or decay factor
  2.22 = conversion from dpm to pCi
  T_s = count time of sample in minutes
  S_b = standard deviation of the blank population

  MDA without Blank Population

$$MDA = \frac{3.29 \times \sqrt{\frac{b}{T_s} + \frac{b}{T_b}}}{K} + \frac{3}{KT_s}$$

  Where:
  b = background count rate in cpm
  T_b = Count time of background in minutes

8.0 Revisions

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of the Quality Assurance Manual are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0	General – Replaced the term "client" with the term "customer" throughout this document. Also changed references to AIHA to AIHA-LAP or AIHA-PAT as appropriate. Section 1.0 – Limited scope of this section to just a general purpose. Removed Index and Revision Status section. Section 2.2 – Updated the current number of employees, the current square footage, and the current number of buildings. Section 3.3 – Added definitions of the TX TRRP terms SQL, MQL, and Unadj. MQL. Added air and emissions to the definition of Environmental Sample. Added definitions of SUMMA canisters and Tedlar bags. Section 3.4 – Added the descriptions of abbreviations AIHA-LAP and AIHA-PAT. Section 4.1.4 – Reworded section for clarity Section 4.1.5 – Reworded section for clarity Section 4.1.6 – Reworded section for clarity Figure 4.1 – Updated Org Chart Section 4.2 – Reworded entire section for clarity Section 4.2.2 – Rewrote the quality policy statement Section 4.2.6 – Renamed Lab Director to Director of Operations and reworded responsibilities. Removed Technical Director. Added Organics Manager and Inorganics Manager. Renamed QA Manager to QA Director. Section 4.2.8 – Added Data Integrity System section Section 4.3 – Reworded entire section for clarity Section 4.3.4 – Added section for Quality Assurance Manual which was previously in 4.2.4 Section 4.4.1 – Added some language about review of routine/non-complex projects Section 4.4.3 – Reworded section for clarity Section 4.5.5 – Added Identification of Sub Work section. Language was previously in 4.5.3 Section 4.6.2 – Reworded section for clarity Section 4.6.3 – Reworded section for clarity Section 4.7 – Reworded some subsections for clarity Section 4.8 – Reworded entire section for clarity Section 4.9 – Reworded entire section for clarity Section 4.10 – Reworded entire section for clarity Section 4.11 – Reworded entire section for clarity Section 4.12 – Reworded entire section for clarity Section 4.14 – Reworded entire section for clarity Section 4.15 – Reworded entire section for clarity Section 5.2.2 – Reworded entire section for clarity Section 5.2.2.4 – Added section for data integrity training Section 5.2.2.5 – Added section for identification of training needs Section 5.2.2.6 – Added section for evaluation of training effectiveness Section 5.2.3 – Reworded section for clarity Section 5.2.5 – Reworded section for clarity Section 5.3.2 – Reworded section for clarity Section 5.3.3 – Reworded section for clarity Section 5.3.4 – Reworded section for clarity Section 5.4.5.4 – Reworded section for clarity Section 5.4.5.5 – Reworded section for clarity Section 5.4.6 – Reworded section for clarity Section 5.4.7.1 – Reworded section for clarity

Document	Revision
	Section 5.4.7.2 – Added in some DoD required items Section 5.4.7.3 – Added data reduction and review section. Language was previously in section 5.11 and section 5.12 Table 5.4.7a – Revised the levels of LIMS security Section 5.5 – Reworded entire section for clarity Section 5.5.2 – Added appropriate calibration curve models, quadratic curve evaluation, and added language about higher order polynomial curves (i.e., third-order and greater) are not allowed at ESC. Section 5.6 – Reworded entire section for clarity Section 5.7 – Reworded entire section for clarity Section 5.7.4 – Added section for laboratory subsampling Section 5.8 – Reorganized and reworded entire section for clarity 5.8.3.1 – Revised Sample Rejection Policy to a Sample Acceptance Policy and changed the criteria that needs to be met. Section 5.9.1 – Reworded section for clarity Section 5.9.2 – Reworded section for clarity Section 5.10 – Reworded entire section for clarity Section 6.4 – Removed language about wipe testing in Metals for lead Section 7 – Added calculations for MDA used in radiological analysis

ESC Site Plan
QUALITY ASSURANCE MANUAL

APPENDIX I TO THE ESC
QUALITY ASSURANCE MANUAL

for

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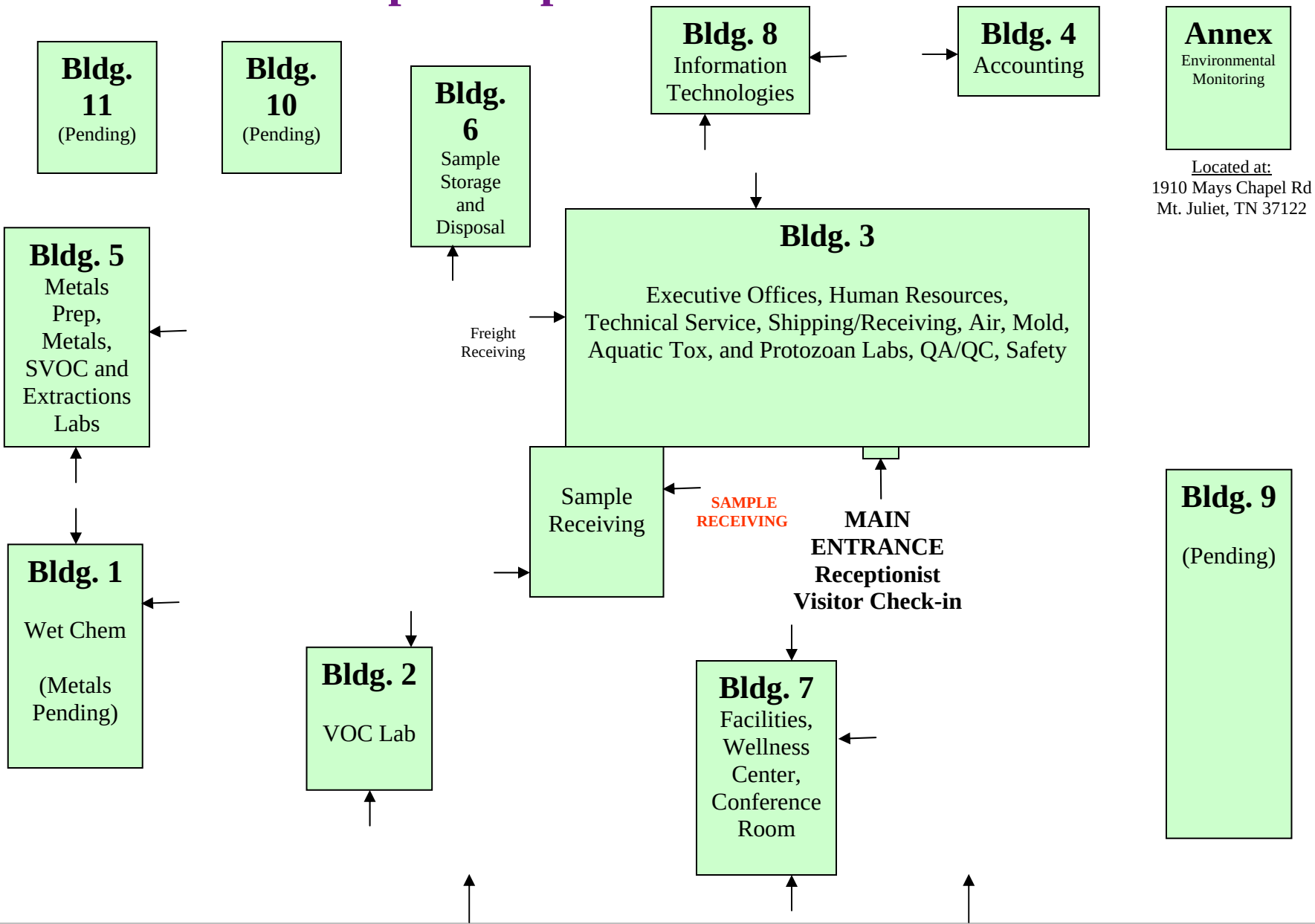
Campus Map


Bldg. 11
(Pending)
Bldg. 10
(Pending)
Bldg. 6
Sample Storage and Disposal
Bldg. 8
Information Technologies
Bldg. 4
Accounting
Annex
Environmental Monitoring
Located at:
1910 Mays Chapel Rd
Mt. Juliet, TN 37122
Bldg. 5
Metals Prep, Metals, SVOC and Extractions Labs
Freight Receiving
Bldg. 3
Executive Offices, Human Resources, Technical Service, Shipping/Receiving, Air, Mold, Aquatic Tox, and Protozoan Labs, QA/QC, Safety
Sample Receiving
SAMPLE RECEIVING
MAIN ENTRANCE
Receptionist
Visitor Check-in
Bldg. 9
(Pending)
Bldg. 1
Wet Chem
(Metals Pending)
Bldg. 2
VOC Lab
Bldg. 7
Facilities, Wellness Center, Conference Room

ESC Certifications
QUALITY ASSURANCE MANUAL

APPENDIX II TO THE ESC QUALITY ASSURANCE MANUAL

for

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Updated 6/8/16 (May be revised without notice)
Scopes of accreditation are on file in the Regulatory Affairs Department and are available upon request.

State/Agency	Certificate Number	Expiration Date/Status	Certified Programs	Approved Programs[6]	Cert.Type	Cert. Authority
Alabama	**40660**	**6/30/2016**	DW	WW, RCRA, UST	Reciprocity	TN
Alaska	**UST-080**	**1/11/2017**	UST	UST	AK	AK
Arizona	**AZ0612**	**6/25/2017**	AIR, DW, WW, RCRA, UST		Audit	AZ
Arkansas	**88-0469**	**1/21/2017**	WW, RCRA, UST, Bioassay		NELAP	NJ
California	**2932**	**8/31/2016**	WW, RCRA, UST		NELAP	NJ
Colorado	**None**	**3/31/2017**	DW	WW, RCRA, UST	Reciprocity	TN
Connecticut	**PH-0197**	**3/31/2017**	DW, WW, RCRA, UST		Reciprocity	NJ
Florida	**E87487**	**6/30/2016**	AIR, DW, WW, RCRA, UST		NELAP	NJ
Georgia DW	**923**	**6/16/2016**	DW		Reciprocity	TN
Georgia	**None**	**11/30/2017**	WW, RCRA, UST		NELAP	NJ
Georgia DW Crypto	**923**	**6/30/2016**	DW		Reciprocity	NJ
Idaho	**TN00003**	**6/16/2016**	DW	WW, RCRA, UST	NELAP	NJ
Illinois	**200008**	**11/30/2016**	DW, WW, RCRA, UST		NELAP	NJ
Indiana	**C-TN-01**	**6/16/2016**	DW	WW, RCRA, UST	Reciprocity	TN
Iowa	**364**	**5/1/2016**	WW, RCRA, UST		Audit	IA
Kansas	**E-10277**	**10/31/2016**	DW, WW, RCRA, UST		NELAP	NJ
Kentucky DW	**90010**	**12/31/2016**	DW	RCRA	Reciprocity	TN
Kentucky UST	**16**	**11/30/2017**	UST		Audit	A2LA
Kentucky WW	**90010**	**12/31/2016**	WW		Reciprocity	NJ
Louisiana	**Agency ID 30792**	**6/30/2016**	WW, RCRA, UST, AIR		NELAP	NJ
Louisiana DW	**LA150002**	**12/31/2016**	DW		NELAP	NJ
Maine	**TN0002**	**7/5/2017**	DW, WW, RCRA, UST		Reciprocity	TN, NJ
Maryland	**324**	**12/31/2016**	DW		Reciprocity	TN
Massachusetts	**M-TN003**	**6/30/2016**	DW,WW	RCRA, UST	Reciprocity	TN
Michigan	**9958**	**6/16/2016**	DW	WW, RCRA, UST	Reciprocity	TN
Minnesota	**047-999-395**	**12/31/2016**	WW, RCRA, UST		Audit	MN
Mississippi	**None**	**6/16/2016**	DW	WW, RCRA, UST	Reciprocity	NJ
Missouri	**340**	**6/16/2016**	DW	WW, RCRA, UST	Reciprocity	NJ
Montana	**CERT0086**	**1/1/2017**	DW	WW, RCRA, UST	Reciprocity	TN
Nebraska	**NA**	**6/30/2016**	DW	WW, RCRA, UST	Reciprocity	TN
Nevada	**TN-03-2002-34**	**7/31/2016**	WW, DW, RCRA, UST		NELAP	NJ
New Hampshire	**2975**	**5/20/2017**	DW, WW, RCRA, UST		NELAP	NJ
New Jersey - NELAP	**TN002**	**6/30/2016**	DW, WW, RCRA, UST, AIR		NELAP	NJ
New Mexico	**None**	**Renewal**	DW	WW, RCRA, UST	NELAP	NJ
New York	**11742**	**4/1/2017**	WW, RCRA, UST, AIR		NELAP	NJ
North C. Aquatic Tox	**41**	**11/1/2016**	Aquatic Toxicity		Audit	NC
North Carolina DW	**DW21704**	**7/31/2016**	DW		Audit	NC
North Carolina	**Env375**	**12/31/2016**	WW, RCRA, UST		Audit	NC
North Dakota	**R-140**	**6/30/2016**	DW, WW, RCRA		Reciprocity	TN, WI
Ohio VAP	**CL0069**	**7/22/2017**	WW, RCRA, UST, AIR		Audit	OH
Oklahoma	**9915**	**8/31/2016**	WW, RCRA, UST, BIOASSAY		NELAP	NJ
Oklahoma DW			DW – Volatiles & Metals		NELAP	NJ
Oregon	**TN200002**	**1/15/2017**	DW, WW, RCRA, UST		NELAP	NJ

State/Agency	Certificate Number	Expiration Date/Status	Certified Programs	Approved Programs[6]	Cert.Type	Cert. Authority
Pennsylvania	**68-02979**	**12/31/2016**	DW, WW, RCRA, UST	0	NELAP	NJ
Rhode Island	**221**	**12/30/2016**	DW	WW, RCRA, UST	Reciprocity	TN
South Carolina	**84004**	**6/30/2016**	WW, RCRA, UST		NELAP	NJ
South Dakota	**Pending**	**Pending**				
Tennessee DW	**2006**	**6/16/2016**	DW	WW, RCRA, UST	Audit	TN
Tennessee DW Micro	**2006**	**10/12/2018**	DW Micro		Audit	TN
Texas - Env.	**T 104704245-07-TX**	**10/31/2016**	DW, WW, RCRA, AIR		Reciprocity	NJ
Texas - Mold	**LAB0152**	**3/10/2017**	MOLD		NA	TX
Utah	**6157585858**	**7/31/2016**	DW, WW, RCRA, UST		NELAP	NJ
Vermont	**VT2006**	**1/5/2017**	DW	WW, RCRA, UST	Reciprocity	TN
Virginia VELAP	**460132**	**6/14/2016**	DW, WW, RCRA, UST		NELAP	NJ
Washington	**C1915**	**8/19/2016**	DW, WW, RCRA, UST, AIR		Audit	A2LA
West Virginia	**233**	**2/28/2017**	WW, RCRA, UST		Audit	WV
West Virginia Crypto	**9966 M**	**12/31/2016**	DW		Reciprocity	NJ
Wisconsin	**998093910**	**8/31/2016**	WW, RCRA, UST, Bioassay		Audit	WI
Wyoming	**A2LA**	**11/30/2017**	UST	WW, RCRA	Audit	A2LA
A2LA[1]	**1461.01**	**11/30/2017**	DW, WW, RCRA, UST, AIR, MICRO		Audit	A2LA
AIHA-LAP[2]	**100789**	**7/1/2016**	EMLAP[4]		Audit	AIHA
DOD	**1461.01**	**11/30/2017**	RCRA, UST		Audit	A2LA
EPA[8]	**TN00003**	**None**	Cryptospiridium		Audit	EPA
EPA[8] Region 8		**7/15/2016**	Drinking Water		Reciprocity	TN
USDA[5]	**S-67674**	**9/3/2018**	Quarantine Permit		Audit	USDA

(1) A2LA = American Association for Laboratory Accred.
(2) AIHA-LAP = American Industrial Hygiene Association Lab Accred. Program
(3) NELAP = National Environmental Laboratory Accred. Program
(4) EMLAP = Environmental Microbiology Laboratory Accreditation Program
(5) USDA = United States Department of Agriculture
(6) Approved Programs = The state does not have a formal certification program.
(7) Pending = The state is processing our application.
(8) EPA = Environmental Protection Agency

1.0 SIGNATORY APPROVALS

SAMPLING PROTOCOL QUALITY ASSURANCE MANUAL

APPENDIX III TO THE ESC QUALITY ASSURANCE MANUAL

for

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Prepared by

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Jim Brownfield, B.S., Compliance Director 615-773-9681

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses the standard practices and procedures utilized by ESC personnel for site selection and sample collection of various matrices. Topics addressed include field QA/QC procedures, together with equipment care and calibration for field sampling activities. Proper collection and handling of samples is of the utmost importance to insure that collected samples are representative of the sampling site. With this goal, proper sampling, handling, preservation, and quality control techniques for each matrix must be established and strictly followed. Precise identification of the collected samples and complete field documentation including a chain of custody are also vital.

ESC Lab Sciences does not provide sampling services for Industrial Hygiene and Environmental Lead analyses. We do require that all samples collected for these programs be sampled using the guidelines established by NIOSH, OSHA or other published protocol.

In addition, ESC Lab Sciences personnel do not conduct sampling in conjunction with the Ohio Voluntary Action Program (VAP).

4.0 LIST OF SAMPLING CAPABILITIES

• **Parameter Group**	• **Sample Source**
Extractable Organics	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Volatile Organic Compounds (VOCs)	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Metals	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Inorganic Anions	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Organics	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Physical Properties	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge
Cyanide	Surface water, wastewater, groundwater, stormwater runoff, drinking water, sediments, soils, chemical/ hazardous wastes, domestic wastewater sludge, hazardous waste sludge

• Parameter Group	• Sample Source
Microbiology	Surface water, groundwater, drinking water, wastewater
Macro Invertebrate Identification	Surface water, wastewater, sediments
Biotoxicity	Surface water and wastewater

5.0 GENERAL CONSIDERATIONS

The following procedures are used in all of ESC's sampling activities. These procedures must be considered in relation to the objectives and scope of each sampling event.

5.1 SELECTING A REPRESENTATIVE SAMPLING SITE

Selecting a representative sampling site is dependent upon the matrix to be sampled and type of analyses required. These matrix specific procedures are discussed in subsequent sections.

5.2 SELECTION AND PROPER PREPARATION OF SAMPLING EQUIPMENT

The type of sampling equipment to be used is specific to the sample matrix and the analyses to be conducted. These are discussed later in this section. Section 12.0 describes the equipment cleaning procedures utilized by ESC personnel.

5.3 SAMPLING PROCEDURES FOR INDUSTRIAL HYGIENE AND ENVIRONMENTAL LEAD SAMPLES

ESC does not provide sampling services for industrial hygiene and/or environmental lead analyses. Experienced laboratory personnel can assist with advice on sampling; however, the adequacy and accuracy of sample collection is the customer's responsibility.

5.4 SAMPLING EQUIPMENT CONSTRUCTION MATERIALS

To prevent direct contamination or cross-contamination of the collected sample, great attention must be given to the construction material used for sampling equipment. Materials must be inert, non-porous and easy to clean. Preferred materials include Teflon®, glass, stainless steel and plastic. Plastics may not be used for collections where organics are the analytes of interest. Stainless steel may not be used where metallic compounds will be analyzed.

5.5 SELECTION OF PARAMETERS BEING ANALYZED

Parameters for analysis are usually dictated by and based on regulated monitoring conditions (i.e. NPDES or RCRA permits). If these do not apply, analyses are selected by ESC or the customer based on federal regulations specific to the matrix being investigated.

5.6 ORDER OF SAMPLE COLLECTION

Unless field conditions demand otherwise, the order of sample collection is as follows:

1. Volatile organic compounds (VOCs)
2. Extractable Organics (includes Total Recoverable Petroleum Hydrocarbons [TRPH], Oil & Grease, Pesticides and Herbicides)
3. Total metals
4. Dissolved metals
5. Microbiological
6. Inorganic (includes Nutrients, Demand, and Physical Properties)
7. Radionuclides

5.7 SPECIAL PRECAUTIONS FOR TRACE CONTAMINANT SAMPLING

Many contaminants can be detected in the parts per billion or parts per trillion range and extreme care must be taken to prevent cross-contamination. Therefore, extra precautions apply where samples are collected for trace contaminants. These precautions include:

- A new pair of disposable latex gloves must be worn at each sampling location.
- Sample containers for samples suspected of containing high concentrations of contaminants are sealed in separate plastic bags immediately after collection and preservation.
- If possible, background samples and source samples should be collected by different field sampling teams. If different field teams are not possible, all background samples are collected first and placed in separate ice chests or shipping containers. Samples of waste or highly contaminated samples are not be placed in the same container as environmental samples. Ice chests or shipping containers for source samples or samples that are suspected to contain high concentrations of contaminants are discarded after use.
- If possible, one member of the field team should handle all data recording, while the other members collect samples.
- When sampling surface waters, water samples should always be collected before sediment samples are collected.
- Sample collection activities should proceed from the suspected area of least contamination to the suspected area of greatest contamination.
- ESC personnel uses equipment constructed of Teflon®, stainless steel, or glass that has been properly pre-cleaned (Sections 12.3 & 12.4) for collecting samples for trace metals or organic compounds analyses. Teflon®, glass, or plastic is preferred for collecting samples where trace metals are of concern. Equipment constructed of plastic or PVC are not be used to collect samples for trace organic compounds analyses.
- When fuel powered units are utilized, they are placed downwind and away from any sampling activities.
- Monitoring wells with free product are not sampled for trace contaminant analysis.

5.8 SAMPLE HANDLING AND MIXING

Sample handling should be kept to a minimum. ESC personnel must use extreme care to avoid sample contamination. If samples are placed in an ice chest, personnel should ensure that sample containers do not become submerged or tip over as this may result in cross-contamination. Small sample containers (e.g., VOCs or bacterial samples) are placed in airtight plastic bags to prevent cross-contamination.

Once a sample has been collected, it may have to be split into separate containers for different analyses. A liquid sample is split by shaking the container or stirring the sample contents with a clean pipette or pre-cleaned Teflon® rod. Then the contents are alternately poured into respective sample containers. Items used for stirring must be cleaned in accordance with the guidelines set forth in Section 12.0. Samples for VOCs, Cyanide, Total Phenol, and Oil & Grease must be collected as discrete grabs.

A soil sample may be split but must first be homogenized as thoroughly as possible to ensure representative sub-samples of the parent material. This is accomplished using the quartering method. The soil is placed in a sample pan and divided into quarters. Each quarter is mixed separately then all quarters are mixed together. This is repeated several times until the sample is uniformly mixed. If a round bowl is used, mixing is achieved by stirring the material in a circular fashion with occasional inversion of the material.

Soil and sediment samples collected for volatile organic compounds are not be mixed. The appropriate sample container should be filled completely, allowing little to no headspace.

Moisture content inversely affects the accuracy of mixing and splitting a soil sample.

5.9 QUALITY CONTROL SAMPLES

Quality control samples must be collected during all sampling events to demonstrate that the sample materials have not been contaminated by sampling equipment, chemical preservatives, or procedures relating to the sample collection, transportation and storage. A summary of the recommended frequency for collecting field quality control samples is presented in the following:

5.9.1 Quality Control Samples

Number of samples	Pre-cleaned equipment blank[1]	Field cleaned equipment blank	Trip blank (VOCs)	Duplicate
10 or more	minimum of 1 then 5%	minimum of 1 then 5%	one per cooler[2]	minimum one then 10%[3]
5 - 9	one	one	one per cooler[2]	one
less than 5	one	one	one per cooler[2]	Not required, but recommend a minimum of one. USACE projects require one. Customer specific QAPP requirements must be considered.

[1] Pre-cleaned blanks are to be collected after the initial decontamination procedure has been completed but before the first sample is collected. Only one pre-cleaned or field-cleaned blank is required if less than 10 samples are collected. Only analyte-free water as defined in this document will be used in the preparation of any field and/or equipment blank.

[2] Where VOC methods are analyzed simultaneously, such as 601/602, only one (1) trip blank is required per cooler.

[3] Duplicate samples are collected for all VOC samples.

5.10 VOLATILE ORGANIC COMPOUND SAMPLING

Water Samples

Generally, groundwater, drinking water and wastewater samples for the analysis of volatile organic compounds are collected in duplicate pre-labeled 40mL vials. During bottle kit preparation in the laboratory, 200µL of concentrated HCl is added to each clean and empty vial. A Teflon® septum is placed in each cap and a cap is placed securely on each vial.

The sampler should check the water being sampled for residual chlorine content. This is done with residual chlorine testing strips. If no chlorine is present, the prepared vials may be filled as needed. If residual chlorine is present, add sodium thiosulfate ($Na_2S_2O_3$) to each vial prior to sampling.

To fill the vial properly, the sample is poured slowly down the inside wall of the vial until a convex meniscus is formed. Care should be taken to minimize turbulence. The cap is then applied to the bottle with the Teflon® side of the septum contacting the sample. Some overflow is lost; however air space in the bottle should be eliminated. Check for air bubbles by inverting the capped vial and tapping against the heel of the hand. This will dislodge bubbles hidden in the cap. If any bubbles are present, repeat the procedureusing a clean vial and re-sample with a new preserved and septum. At a minimum, duplicate vials should always be collected from each sample location.

For analysis using EPA Method 524.2, samples that are suspected to contain residual chlorine, 25mg of ascorbic acid per 40mL of sample is added to each sample vial prior to sampling. Additionally, if analytes that are gases at room temperature (i.e. vinyl chloride, etc.) or any of the analytes in following table are not to be determined, 3mg of sodium thiosulfate is recommended for use to remove residual chlorine during sampling. If residual chlorine is present in the field sample at >5mg/L, then add additional 25mg or ascorbic acid or 3mg of sodium thiosulfate for each 5mg/L of residual chlorine present. Sample vials are filled as previously described. Following collection and dechlorination, Method 524.2 samples are adjusted to a pH of <2 with HCl.

Acetone	Acrylonitrile	Allyl chloride
2-Butanone	Carbon disulfide	Chloroacetonitrile
1-Chlorobutane	t-1,2-Dichloro-2-butene	1,1-Dichloropropanone
Diethyl ether	Ethyl methacrylate	Hexachloroethane
2-Hexanone	Methacrylonitrile	Methylacrylate
Methyl iodide	Methylmethacrylate	4-Methyl-2-pentanone
Methyl-tert-butyl ether	Nitrobenzene	2-Nitropropane
Pentachloroethane	Propionitrile	Tetrahydrofuran

For more detailed instructions, see the published method.

Soil Samples

Option 1 – Core Sampling Device
Soil samples for volatile organic analysis are sampled using traditional core sampling methods. Once the core sample is collected, additional samples should be taken using an Encore™ sampler, either 5g or 25g, capped, sealed, and immediately cooled. The holding time for this method is 48 hours.

Option 2 – Pre-weighed Vial
In the other option for volatile soil sampling, 40mL vials with cap, Teflon® lined septum, preservative (5mL sodium bisulfate solution), and stir bar are pre-weighed, either by the user or the manufacturer. The vial is weighed on a balance capable of measuring to 0.01g and labeled with the pre-weighed value. In the field, place roughly 5g of sample into a pre-weighed vial, cap, and then immediately place on ice to achieve a temperature of ≤6ºC. Exact soil weights can be measured using the pre-weight of the vial and the post-sampling weight. The difference represents the actual weight of the soil sample. The holding time for this method is 14 days.

Unless specifically permitted by the regulatory authority, VOC samples (liquid or solid) should never be mixed or composited.

5.11 OIL AND GREASE SAMPLING

Aqueous samples collected for oil and grease analyses must be collected as discrete grab samples. Sample containers should not be rinsed with sample water prior to sample collection and samples should be collected directly into the sample container. Intermediate vessels should only be used where it is impossible to collect the sample directly into the sample container and, in this case, only Teflon® beakers should be used. Samples should be taken from well-mixed areas.

5.12 CYANIDE SAMPLING

Cyanide is a very reactive and unstable compound and should be analyzed as soon as possible after collection. Samples are collected in polyethylene or glass containers and are pretreated and preserved in the manner specified in the following paragraphs.

5.12.1 Test for Oxidizing Agents

1. Test the sample with residual chlorine indicator strips.
2. Add a few crystals of ascorbic acid and test until negative.
3. Add an additional 0.6 grams of ascorbic acid for each liter sampled to remove residual chlorine.
4. Preserve the pretreated sample by to a pH > 12.0 with NaOH and cool to 4 $\pm$ 2°C. Verify the pH of the samples as per Section 14.2.
5. Equipment blanks must be handled in the same manner as described in steps 1 through 4.

5.12.2 Test for Sulfide

1. Test the sample for sulfide using the sulfide test strip (formally HACH KIT).
2. If sulfide is not removed by the procedure below, the sample must be preserved with NaOH to pH > 12.0 and analyzed by the laboratory within 24 hours.
3. Sulfide should be removed by filtering visible particulate. Retain filter (filter #1).
4. Remove the sulfide by adding lead carbonate powder to the filtrate to cause the sulfide to precipitate out.
5. Test the filtrate for the presence of sulfide. If sulfides are present, repeat steps 1 and 4 until no sulfides are shown present.
6. The precipitate can now be filtered from the sample and this filter is discarded.
7. The sample is then reconstituted by adding the sediment collected on filter #1 back to the filtrate.
8. Preserve the pretreated sample to a pH > 12.0 with NaOH and cool to 4 $\pm$ 2°C. Verify the pH of the samples as per Section 14.2
9. Equipment blanks must be handled in the same manner as described in steps 1 through 9.

5.13 BIOMONITORING SAMPLING

Aqueous samples collected for Bioassay can be collected in either glass or HDPE plastic. There is no chemical preservation for this type of sample and the required volume varies with each type of analysis. Following sampling, all samples must be cooled to 0-6°C and can be held for a maximum of 36 hours from the time of collection. Grab and composite sample protocols are utilized for acute and chronic bioassays and are chosen according to permit requirements. Samples are collected with minimum aeration during collection and the container are filled allowing no headspace. Samples may be shipped in one or more 4L (l gal.) CUBITAINERS® or unused plastic "milk" jugs. All sample containers should be rinsed with source water before being filled with sample. Containers are not reused. If the sample is a chlorinated effluent, total residual chlorine must be measured immediately following sample collection.

5.14 PROCEDURES FOR IDENTIFYING POTENTIALLY HAZARDOUS SAMPLES

Any sample either known, or suspected, to be hazardous are identified as such on the chain of custody. Information explaining the potential hazard (i.e., corrosive, flammable, poison, etc.) are also be listed.

5.15 COLLECTION OF AUXILIARY DATA

All auxiliary data are entered in the field records. Auxiliary data relative to a particular sampling location should be recorded concurrent with the sample event. Matrix specific auxiliary data are discussed later in this section.

5.16 TIME RECORDS

All records of time are kept using local time in the military (24 hour) format and are recorded to the nearest minute.

5.17 REFERENCES

ESC maintains copies of the various sampling references in the sample equipment room. Pertinent pages of these documents may be photocopied and taken to the field during sampling investigations. A bibliography of references used in the development of this section is presented in Section 17.

6.0 ANCILLARY EQUIPMENT AND SUPPLIES

The equipment used to collect samples and conduct necessary purging activities is listed in subsequent sections for each type of sample. However, Section 6.1 lists some of the ancillary field equipment and instruments that may be required.

6.1 ANCILLARY EQUIPMENT AND SUPPLIES

Flow Measurement:	ISCO Continuous Flow Meters 3230, 3210, 2870; Flo-Poke pipe insert
Personal Protective Equipment:	Hard Hats, Face Shields, Rubber and Latex Gloves, Tyvex protective coveralls, rubber boots, safety glasses
Field Instruments:	Water Level Indicator, Continuous Recording pH Meter, Portable pH/Temperature Meters, Hach DR-100 Chlorine Analyzer, Hach CEL/700 Portable Laboratory, YSI Field Dissolved Oxygen/Temperature Meter w/ Submersible Probe, Portable Field Specific Conductance Meter, Hach 2100P Portable Turbidimeter
Chemical Supplies & Reagents:	Deionized Water, Tap Water, Liquinox Detergent, Isopropanol, Nitric Acid, Hydrochloric Acid, Sulfuric Acid, Sodium Hydroxide, Ascorbic acid, Sodium Thiosulfate, Ascorbic Acid, Zinc Acetate, pH calibration buffers (4.0, 7.0, and 10.0), Hach Sulfide Kit, lead carbonate powder, Specific Conductance Standard, Turbidity Standards
Tools:	Pipe Wrench, Bung Wrench, Crowbar, Hammer, Assorted Screwdrivers, Tape Measures, Channel Lock Pliers, Vise Grip Pliers, Duct Tape, Vinyl Pull Ties
Miscellaneous:	Cellular Phones, Pagers, Walkie Talkies, 12 Volt Batteries, Flashlights, Extension Cords, Brushes, Plastic sheeting, Fire extinguishers, Water Squeeze Bottles, First Aid Kit, lengths of rigid PVC conduit, aquatic sampling nets (Wildco)

7.0 WASTEWATER SAMPLING

7.1 SAMPLING EQUIPMENT

Type	Use	Materials	Permissible Parameter Groups
Continuous Wastewater Samplers-Peristaltic Pump	Sampling	Tygon tubing; glass or plastic sample container	All parameter groups except oil & grease, extractable organics, and VOCs
	Sampling	Teflon® tubing; glass sample container	All parameter groups except VOCs

7.2 GENERAL CONSIDERATIONS

The procedures used by ESC are generally those outlined in the *NPDES Compliance Inspection Manual*. Additional guidance is given in the EPA *Handbook for Monitoring Industrial Wastewater*. Some important considerations for obtaining a representative wastewater sample include:

- The sample should be collected where the wastewater is well mixed.
- Samples should not be collected directly from the surface/bottom of the wastestream.
- In sampling from wide conduits, cross-sectional sampling should be considered.
- If manual compositing is employed, the individual sample bottles must be thoroughly mixed before pouring the individual aliquot into the composite container.

7.3 SAMPLING SITE SELECTION

Wastewater samples should be collected at the location specified in the NPDES or sewer use permit if such exists. If the specified sampling location proves unacceptable, the project manager shall select an appropriate location based on site-specific conditions. An attempt should be made to contact the regulatory authorities for their approval. The potential for this type of issue highlights the need for a site inspection prior to the scheduled sampling event.

7.3.1 Influent

Influent wastewaters should be sampled at points of high turbulence and mixing. These points are: (1) the upflow siphon following a comminutor (in absence of grit chamber); (2) the upflow distribution box following pumping from main plant wet well; (3) aerated grit chamber; (4) flume throat; or (5) pump wet well when the pump is operating. Raw wastewater samples should be collected upstream of sidestream returns.

7.3.2 Effluent

Effluent samples should be collected at the site specified in the permit or, if no site is specified, at the most representative site downstream from all entering wastewater streams prior to final discharge.

7.3.3 Pond and Lagoon Sampling

Composite samples of pond and lagoon effluent are preferred over grabs due to the potential for ponds and lagoons to short circuit the projected flow paths. However, if dye studies or facility data indicate a homogeneous discharge, grab samples may be taken.

7.4 SAMPLING TECHNIQUES: GENERAL

The choice of a flow-proportional or time-proportional composite sampling program depends upon the variability of flow, equipment availability, sampling point configuration and accessibility. Flow metered sampling is necessary for complete wastewater characterization and should be utilized where possible. If not feasible, a time-proportional composite sample is acceptable.

A time-proportional composite sample consists of aliquots collected at constant time intervals and can be collected either manually or with an automatic sampler.

A flow proportional composite sample consists of aliquots collected automatically at constant flow intervals with an automatic sampler and a flow-measuring device. Prior to flow-proportional sampling, the flow measuring system (primary flow device, totalizer, and recorder) should be examined. The sampler may have to install flow measurement instrumentation if automatic sampling is to be used.

7.5 USE OF AUTOMATIC SAMPLERS

7.5.1 General

Automatic samplers are used when several points are sampled at frequent intervals, with limited personnel, or when a continuous sample is required. Automatic samplers used by ESC must meet the following requirements:

- Must be properly cleaned to avoid cross-contamination from prior sampling events.
- No plastic or metal parts shall come into contact with the sample when parameters to be analyzed could be impacted by these materials.
- Must be able to provide adequate refrigeration. Commercially available ice is placed in the sampler base and packed around the container approximately half way up the sample container.
- Must be able to collect a large enough sample for all required analyses. Composite sample containers (glass or plastic) hold up to 10 liters.
- A minimum of 100 milliliters should be collected each time the sampler is activated.
- Should provide a lift of at least 20 feet and be adjustable so that sample volume is not a function of pumping head.
- Pumping velocity must be adequate to transport solids without settling.
- The intake line must be purged a minimum of one time before each sample is collected.
- The minimum inside diameter of the intake line should be 1/4 inch.
- Have a power source adequate to operate the sampler for 48 hours at 15-minute sampling intervals.
- Facility electrical outlets may be used if available.

- Facility automatic samplers may be used for conventional parameters if they meet ESC QA/QC criteria.

Specific operating instructions, capabilities, capacities, and other pertinent information for automatic samplers presently used by ESC are included in the respective operating manuals and are not presented here.

All data relative to the actual use of automatic equipment on a specific job is recorded in sampling logbooks.

7.5.2 Equipment Installation

7.5.2.1 Conventional Sampling

Automatic samplers may be used to collect time-proportional composite or flow-proportional composite samples. In the flow-proportional mode, the samplers are activated by a compatible flow meter. Flow-proportional samples can also be collected using a discrete sampler and a flow recorder and manually compositing the individual aliquots in flow-proportional amounts.

Installation procedures include cutting and installing the proper length of tubing, positioning it in the wastewater stream, and sampler programming. All new tubing (Dow® Corning Medical Grade Silastic, or equal, in the pump and Tygon®, or equal, in the sample train) will be used for each sampler installation.

For a time-proportional composite, the sampler should be programmed to collect 100mL samples at 15-minute intervals into a refrigerated 10L plastic or glass jug, as appropriate for the particular parameters being analyzed.

For a flow-proportional composite, the sampler should be programmed to collect a minimum of 100mL for each sample interval. The sampling interval should be based on the flow of the waste stream.

7.5.3 Automatic Sampler Maintenance, Calibration, and Quality Control

To ensure proper operation of automatic samplers, the procedures outlined in this section are used to maintain and calibrate ESC automatic samplers. Any variance from these procedures is documented.

Proper sampler operation is checked by ESC personnel prior to each sampling event. This includes checking operation through three cycles of purge-pump-purge; checking desiccant and replacing if necessary; checking charge date on NiCad batteries to be used; and repairing or replacing any damaged items.

Prior to beginning sampling, the purge-pump-purge cycle is checked at least once. The sample volume is calibrated using a graduated cylinder at least twice, and the flow pacer that activates the sampler is checked to be sure it operates properly.

Upon return from a field trip, the sampler is examined for damage. The operation is checked and any required repairs are performed and documented. The sampler is then cleaned as outlined in Section 12.

7.6 MANUAL SAMPLING

Manual sampling is normally used for collecting grab samples and for immediate in-situ field analyses. Manual sampling may also be used when it is necessary to evaluate unusual waste stream conditions. If possible, manually collected samples are collected in the actual sample container that is submitted to the laboratory. This minimizes the possibility of contamination from an intermediate collection container.

Manual samples are collected by (1) submerging the container neck first into the water; (2) inverting the bottle so that the neck is upright and pointing into the direction of wastewater flow; (3) quickly returning the sample container to the surface; (4) shake to rinse. Pour the contents out downstream of sample location; (5) collect sample as described in steps 1, 2, and 3; pour out a few mL of sample downstream of sample collection. This allows for addition of preservatives and sample expansion.

Exceptions to the above procedure occur when preservatives are present in the sampling container or when oil & grease, microbiological, and/or VOC analyses are required. In these cases, samples are collected directly into the container with no pre-rinsing.

If the water or wastewater stream cannot be physically or safely reached, an intermediate collection container may be used. This container must be properly cleaned (Section 12) and made of an acceptable material. A separate collection container should be used at each sampling station to prevent cross-contamination between stations. The sample is collected by lowering a properly cleaned Teflon®, plastic, or glass collection vessel into the waste stream. The intermediate vessel may be lowered by hand, pole or rope.

7.7 SPECIAL SAMPLE COLLECTION PROCEDURES

7.7.1 Trace Organic Compounds and Metals

Due to the ability to detect trace organic compounds and metals in extremely low concentrations, care must be taken to avoid contamination of the sample. All containers, composite bottles, tubing, etc., used in sample collection for trace organic compounds and metals analyses should be prepared as described in Section 12.

Personnel handling the sample should wear a new pair of disposable latex gloves with each set of samples collected to prevent cross-contamination. A more detailed discussion is given in Section 5.7 under special precautions for trace contaminant sampling.

7.7.2 Bacterial Analysis

Samples for bacterial analysis are always collected directly into the prepared glass or plastic sample bottle. The sample bottle should be kept closed until immediately prior to sampling and never rinsed with sample. When the container is opened, care should be taken not to contaminate the cap or the inside of the bottle. The bottle should be held near the base and plunged, neck downward, below the surface and turned until the neck points upward and upstream. The bottle should be filled to within one-inch of the top and capped immediately.

Section 14 presents preservation procedures and holding times. As holding times are limited to 6 hours for microbiological analyses, special arrangements may be required to ensure that these samples reach the laboratory within this timeframe.

7.7.3 Immiscible Liquids/Oil and Grease

Oil and grease may be present in wastewater as a surface film, emulsion, solution, or a combination of these forms. A representative sample for oil and grease analysis is difficult to collect. The sampler must carefully evaluate the location of the sampling point to find the area of greatest mixing. Quiescent areas should be avoided.

Because losses of oil and grease will occur on sampling equipment, collection by composite sampler is not practical. Intermediate sampling vessels should not be used if possible. If intermediate collection vessels are required they should be made of Teflon® and be rinsed with the sample three times before transferring any sample to the sample container. Sample containers, however, should never be rinsed.

7.7.4 Volatile Organic Compounds Analyses

Water samples to be analyzed for volatile organic compounds are collected in 40mL pre-preserved (200uL of concentrated HCl) vials with screw caps. A Teflon®-silicone septum is placed in each cap prior to the sampling event. The Teflon® side must be facing the sample.

Sampling containers with preservatives are pre-labeled prior to any field activities to reduce the chances of confusion during sampling activities. A complete list of sample preservatives, containers, holding times, and volumes is found in Section 14.

The sampler should check the water to be sampled for chlorine. This is done with residual chlorine indicator strips. If no chlorine is found, the vials may be filled. If residual chlorine is present, the sampling and preservation procedures listed in Section 5.10 of this manual must be performed.

7.8 AUXILIARY DATA COLLECTION

While conducting wastewater sampling, the following information may also be gathered:

- Field measurements -- pH, DO, conductivity, temperature
- Flows associated with the samples collected -- continuous flows with composite samples and instantaneous flows with grab samples
- Diagrams and/or written descriptions of the sample locations
- Photographs of pertinent wastewater-associated equipment, such as flow measuring devices, treatment units, etc.
- Completion of applicable forms required during specific investigations.

All observations, measurements, diagrams, etc., are entered in field logbooks or attached thereto.

8.0 SURFACE WATER AND SEDIMENT SAMPLING

8.1 EQUIPMENT

Equipment Type	Use	Material	Permissible Parameter Groups
Surface Water Sampling			
Kemmerer Sampler	Depth sampling	PVC	All parameter groups except extractable organics, VOCs, and oil & grease
Automatic Samplers	Sampling	Teflon®	All parameter groups except VOCs, oil & grease, & micro
	Sampling	PVC	All parameter groups except extractable organics, VOCs, oil & grease, and micro
Sample Collection Container	Sampling	Stainless steel	All parameter groups
Bailers	Sampling	Teflon®	All parameter groups
	Sampling	PVC	All parameter groups except extractable organics, VOCs, and oil & grease
Sediment Sampling			
Hand Augers	Sampling	Carbon Steel	Demand, nutrients, and extractable organics (for hard packed soils only)
Sediment Core Sampler	Sampling	Stainless Steel, Teflon®	All parameter groups
Encore™	Sampling	Teflon®	VOC Sediment/soil
Scoops	Sampling	Teflon® coated	All parameter groups

Equipment Type	Use	Material	Permissible Parameter Groups
Mixing Bowl	Compositing	Glass	All parameter groups except VOCs
Spoons, spatula	Sampling, compositing	Stainless Steel	All parameter groups

8.2 GENERAL

Selection of surface water sampling locations for water quality studies are determined by the objective of the study and waterway type. Factors that impact and alter water quality and characteristics (dams, bridges, discharges, etc.) must be considered. Accessibility is important.

8.3 SAMPLE SITE SELECTION

Fresh water environments are commonly divided into two types: (1) rivers, streams, and creeks; and (2) lakes, ponds, and impoundments. Since these waterways differ considerably in general characteristics, site selection must be adapted to each.

Prior to conducting a sampling event, an initial survey should be conducted to locate prime sampling points. Bridges and piers provide ready access to sampling points across a body of water. However, they should only be used when found not to be detrimentally impacting stream characteristics.

If wading for water samples must be done, caution should be used to avoid disturbing bottom deposits that could result in increased sediment in the sample. Shallow areas may be best for sediment sampling.

8.3.1 Rivers, Streams, and Creeks

Sampling sites should be located in areas possessing the greatest degree of cross-sectional homogeneity. Such points are easily found directly downstream of a riffle or rapid. These locations are also good for sediment sampling. In the absence of turbulent areas, a site that is clear of immediate point sources, such as tributaries and effluent discharges, may be used.

Typical sediment deposition areas are located at the inside of river bends and down-stream of islands or other obstructions. Sites immediately upstream or downstream from the confluence of two streams or rivers should be avoided due to inadequate mixing of the combining flows. Also, backflow can upset normal flow patterns.

Great attention should be given to site selection along a stream reach:

- Sites should be spaced at intervals based on time-of-water-travel. Sampling sites may be located at about one-half day time-of-water-travel for the first three days downstream of a waste source for the first six sites and then approximately one day for the remaining distance.

- If the study data is for comparison to previous study data, the same sampling sites should be used.
- Sites should be located at marked physical changes in the stream channel.
- Site locations should isolate major discharges as well as major tributaries.

Dams and weirs usually create quiet, deep pools in river reaches that would otherwise be swift and shallow. When times of travel through them are long, sites should be established within them.

Some structures, such as dams, permit overflow that may cause significant aeration of oxygen deficient water. Sites should be located short distances upstream and downstream of these structures to measure the rapid, artificial increase in dissolved oxygen (DO), which is not representative of natural aeration.

A minimum of three sites should be located between any two points of major change in a stream, even if the time-of-travel between the points of change is short. Major changes include, but are not limited to, a waste discharge, a tributary inflow, or a significant change in channel characteristics. Sampling three sites is also important when testing rates of change of unstable constituents. Results from two of three sites will usually support each other and indicate the true pattern of water quality in the sampled zone. If the effect of certain discharges or tributary streams of interest is desired, sites should be located both upstream and downstream of these points.

Due to the tendency of the influent from a waste discharge or tributary to slowly mix, cross-channel, with the main stream, it is nearly impossible to measure their effect immediately downstream of the source. Thus, samples from quarter points may miss the wastes and only indicate the quality of water above the waste source. Conversely, samples taken directly in the stream portion containing the wastes would indicate excessive effects of the wastes with respect to the river as a whole.

Tributaries should be sampled as near the mouth as possible. Often, these may be entered from the main stream for sampling by boat. Care should be taken to avoid collecting water from the main stream that may flow back into the tributary as a result of density differences created by temperature, salinity, or turbidity differences.

Actual sampling locations vary with the size and amount of turbulence in the stream or river. Generally, with streams less than 20 feet wide, well mixed areas and sampling sites are readily found. In such areas, a single grab sample taken at mid-depth at the center of the channel is adequate. A sediment sample can also be collected at the center of the channel. For slightly larger streams, at least one vertical composite should be taken from mid-stream. It should be composed of at least one sub-surface, mid-depth, and above the bottom sample. Dissolved oxygen, pH, temperature, conductivity, etc. should be measured on each aliquot of the vertical composite. Several locations should be sampled across the channel width on the larger rivers. Vertical composites across the channel width should be located

proportional to flow, i.e., closer together toward mid-channel where flow is greater and less toward the banks where the flow proportionally lower.

The field crew will determine the number of vertical composites and sampling depths for each area. They should base their decisions upon two considerations.

1. The larger the number of sub-samples, the more nearly the composite sample will represent the water body.
2. Taking sub-samples is time consuming and expensive, and increases the chance of contamination.

A number of sediment samples should be collected along a cross-section of a river or stream to adequately characterize the bed material. The normal procedure is to sample at quarter points along the cross-section of the site. When the sampling technique or equipment requires that the samples be extruded or transferred at the site, they can be combined into a single composite sample. However, samples of dissimilar composition should not be combined. They should be kept separate for analysis in the laboratory. To ensure representative samples, coring tubes are employed. The quantity of each sub-sample that is composited shall be recorded.

8.3.2 Lakes, Ponds, and Impoundments

Lakes, ponds, and impoundments have a much greater tendency to stratify than rivers and streams. This lack of mixing requires that more samples be obtained from the different strata. Occasionally, extreme turbidity differences occur vertically where a highly turbid river enters a lake. This stratification is caused by temperature differences where the cooler, heavier river water flows beneath the warmer lake water. A temperature profile of the water column and visual observation of lake samples can detect these layers. Each layer of the stratified water column should be sampled.

The number of sampling sites on a lake, pond, or impoundment is determined by the objectives of the investigation dimensions of the basin. In small bodies of water, a single vertical composite at the deepest point may be sufficient. Dissolved oxygen, pH, temperature, etc., should be conducted on each vertical composite aliquot. In naturally formed ponds, the deepest point is usually near the center; in impoundments, the deepest point is usually near the dam.

In lakes and larger impoundments, several vertical sub-samples should be composited to form a single sample. These vertical sampling locations should be along a transaction or grid. The field crew will determine the number of vertical composites and sampling depths for each area. In some cases, separate composites of epilimnetic and hypolimnetic zones may be required. Additional separate composite samples may be needed to adequately represent water quality in a lake possessing an irregular shape or numerous bays and coves. Additional samples should always be taken where discharges, tributaries, agriculture, and other such factors are suspected of influencing water quality.

When collecting sediment samples in lakes, pond, and reservoirs, the sample site should be as near as possible to the center of the water mass, especially for impoundments of rivers or streams. Generally, coarser grained sediments are deposited at the headwaters of a reservoir, and the finer sediments are near the center. The shape, inflow pattern, bathymetry, and circulation affect the location of sediment sampling sites in large bodies of water.

8.3.3 Control Sites

The collection of samples from control sites is necessary to compile a basis of comparison of water quality. A control site above the point of interest is as important as the sites below, and must be chosen with equal care. Two or three sites above the waste inflow may be necessary to establish the rate at which any unstable material is changing. The time of travel between the sites should be sufficient to permit accurate measurement of the change in the material under consideration.

8.4 SAMPLING EQUIPMENT AND TECHNIQUES

8.4.1 General

Any equipment or sampling techniques used to collect a sample must not alter the integrity of the sample and must be capable of providing a representative sample.

8.4.2 Water Sampling Equipment/Techniques

The physical location of the collector dictates the type of equipment needed to collect samples. Surface water samples may be collected directly into the sample container when possible. Pre-preserved sample containers shall never be used as intermediate collection containers. Samples collected in this manner use the methods specified in Section 7.6 of this manual. If wading into the stream is required, care should be taken not to disturb bottom deposits, which could be unintentionally collected, and bias the sample. Also, the sample should be collected directly into the sample bottle and **up current** of the wader. If wading is not possible or the sample must be collected from more than one depth, additional sampling equipment may be used. If sampling from a powerboat, samples must be collected upwind and upstream of the motor.

8.4.2.1 Sampling Procedure Using a Teflon® or PVC Bailer

If data requirements of surface water sampling do not necessitate sampling from a strictly discrete interval of the water column, Teflon® or PVC constructed bailers can be used for sampling. The type bailer used is dependent on the analytical requirements. A closed top bailer utilizing a bottom check valve is sufficient for many surface water studies. Water is continually displaced through the bailer as it is lowered down through the water column until the specified depth is attained. At this point, the bailer is retrieved back to the surface. There is the possibility of

contamination to the bailer as it is lowered through the upper water layers. Also, this method may not be successful in situations where strong currents are found or where a discrete sample at a specified depth is needed.

If depth specific, discrete samples are needed and the parameters do not require Teflon® coated sampling equipment, a standard Kemmerer sampler may be used. A plastic bucket can also be used to collect surface samples if parameters to be analyzed do not preclude its use. The bucket shall always be rinsed twice with the sample water prior to collection and the rinse water be disposed of downstream from the sample collection point. All field equipment will be cleaned using standard cleaning procedures.

8.4.2.2 Sampling Procedure Using a Kemmerer Sampler

Due to the PVC construction of the Kemmerer sampler, it shall not be used to collect samples for extractable organics, VOCs, and/or oil & grease analysis. The general collection procedure is as follows:

1. Securely attach a suitable line to the Kemmerer bottle.
2. Lock stoppers located at each end of the bottle on the open position. This allows the water to be drawn around the bottom end seal and into the cylinder at the specified depth.
3. The bottle is now in the set position. A separate "messenger" is required to activate the trip mechanism that releases the stopper and closes the bottle.
4. When the bottle is lowered to the desired depth, the messenger is dropped. This unlocks the trip mechanism and forces the closing of both end seals.
5. Raise the sampler, open one of the end seal, and carefully transfer the sample to the appropriate sample container.

8.4.2.3 Sampling Procedures Using Sample Collection Containers

In most cases, sample collection containers are used to collect surface water from easily accessible sampling points. This means that the sample is collected manually, always upstream of the sampling person's position. An extension may be added to the container to make the sampling point more accessible for manual sampling. Extensions can be constructed of aluminum, PVC, steel, or any other suitable material. The sample container is normally attached to the extension using a clamp, vinyl pull ties, or duct tape. Samples collected in this way are done so in the following manner:

1. Place the inverted sample container into the water and lower to the desired depth. Never use a pre-preserved container as an intermediate sample collection device.
2. Re-invert the container with the mouth facing into the direction of flow and at the appropriate depth to collect the desired sample.
3. Carefully bring the container to the surface and transfer to the appropriate container.

8.4.3 Sediment Sampling Equipment/Techniques

A variety of methods can be used to collect sediment samples from a streambed. ESC utilizes corers and scoops. Precautions must be taken to ensure that the sample collected is representative of the streambed. These methods are discussed in the following paragraphs.

8.4.3.1 Sediment Core Samplers

Core sampling is used to collect vertical columns of sediment from the stream or lakebed. Many types of coring devices are available for use depending on the depth of water from which the sample is obtained, the type of bottom material, and the length of the core to be collected. Some devices are weight or gravity driven while others are simple hand push tubes. These devices minimize the loss of fine particles and should always be used when collecting sediment samples from flowing waters.

Coring devices are particularly useful in pollutant monitoring because the shock wave created by sampler descent is minimized and the fines at the sediment-water interface are only slightly disturbed. The sample can be withdrawn primarily intact removing only the layers of interest. Core liners manufactured of Teflon® or plastic can be purchased. These liners reduce the possibility of contamination and can be delivered to the laboratory in the tube they were collected in. Coring devices sample small surface areas and small sample sizes and often require repetitive sampling to obtain a sufficient amount of sample. This is the primary disadvantage to these devices but they are recommended in the sampling of sediments for trace organic compounds or metals analyses.

When sampling sediments in shallow water, the direct use of a core liner is recommended. Stainless steel push tubes are also used because they provide a better cutting edge and higher tensile strength than Teflon® or plastic. One advantage to using the Teflon® or plastic tubes is the elimination of possible metals contamination of the sample from the core barrels or cutting heads. The length of the corer tube should correspond to the desired depth of the layer being sampled. In general, soft sediments adhere better to the inside of the tube and a larger diameter tube can be used. Coarser sediments require the use of a smaller diameter tube of two inches or less to prevent the sample from falling out of the tube. The inside bottom wall of the tube can be filed down to allow easier entry into the substrate.

When samples are obtained by wading, caution should be used to minimize disturbance in the area sampled. Core tubes are pushed directly down into softer substrates until four inches or less of the tube is above the sediment-water interface. A slight rotation of the tube may be necessary to facilitate ease of entry into harder substrates and reduce compaction of the sample. The tube is then capped and slowly extracted and the bottom of the corer is capped before it is pulled above the water surface.

Sub-sampling is performed for VOC samples using an Encore™ type sampling device. This device is used to collect soil/sediment samples, while preventing container headspace. Once the core sample is collected, additional samples should be taken using an Encore™ type sampler, either 5g or 25g, capped, sealed, and immediately chilled to 4ºC. The holding time for this sampling method is 48 hours. Alternatively, weigh 5g of sample into a pre-weighed vial (with a Teflon® lined screw cap) containing, 5mL sodium bisulfate solution and a magnetic stir bar, cap, and then ice to 4ºC. The holding time for this method is 14 days.

8.4.3.2 Scooping Samples

The easiest and quickest way to collect a sediment sample in shallow water is with a Teflon® coated scoop or stainless steel spoon. This type of sampling should be limited to quiescent (i.e., non-flowing) waters such as lakes or reservoirs.

8.4.3.3 Mixing

As specified in Section 5.8, sediment samples, collected for chemical analysis, should be thoroughly mixed (except for volatile organic compounds analysis) before being placed in the sample containers.

8.5 SPECIAL SAMPLE COLLECTION TECHNIQUES

8.5.1 Trace Organic Compounds and Metals

Samples for trace pollutant analyses in surface water should be collected by dipping the sample containers directly into the water. Sometimes samples are split for enforcement or quality control purposes. A sufficient volume of sample for all containers should be collected in a large glass container and then, while mixing, be alternately dispensed into the appropriate bottles. This cannot be done for volatile organic compound samples due to potential loss of target analytes.

Only Teflon® or stainless steel should be used in sediment sampling for trace contaminant analyses. Teflon® coring tubes are the preferred technique.

8.5.2 Bacterial Analysis

Samples for bacteriological examination must be collected in sterilized bottles and protected against contamination. The preferred technique is to collect sample directly into the sample bottle. Hold the bottle near the base and plunge, neck downward, below the surface. The container is then turned with the neck pointed slightly upward and the mouth directed toward the current. The bottle is filled to about ½ inch from the top and recapped immediately. While the bottle is open, extreme care should be used to protect both the bottle and stopper against contamination. The ½ inch air space is left in the bottle to facilitate subsequent shaking in the laboratory.

If sampling with an intermediate sampling device (i.e. bailer), the device shall be thoroughly rinsed with sample water prior to collecting the sample. For this reason, microbiological samples are among the final samples collected from a sampling site. Begin pouring sample out of the sampling device before collecting into the sterilized container. Continue pouring sample out of the device, place the container under the flowing stream, and fill the container to ½ inch from the top. Flow should remain continuous before and during the filling process.

When sampling from a bridge, the sterilized sample bottle can be weighted and lowered to the water on a rope. Collectors must be careful not to dislodge debris from the bridge that could fall into the bottle.

8.6 AUXILIARY DATA COLLECTION

A field logbook is used to record data pertinent to sampling activities. This data describes all sampling locations and techniques, lists photographs taken, visual observations, etc. Visual observations of sample site conditions, including weather and overall stream conditions, recorded during the investigation can be valuable in interpreting water quality study results.

8.7 SPLIT AND DUPLICATE SAMPLE COLLECTION

Split samples measure variability between analysts, methods, and laboratories and are taken as subsamples from a single sample. This is unlike duplicate samples that measure variability inherent in the collection method or waste stream and are obtained in close succession during the same sampling event.

8.7.1 Split Sample Collection

Split samples are collected as follows:

1. Sample must be collected in a properly cleaned container constructed of acceptable materials. The volume should be more than twice the volume required for one sample.
2. Add appropriate preservative where required.
3. Mix thoroughly.
4. Alternately, decant sample into subsample containers in increments of approximately 10% of total subsample volume until containers are full.
5. Seal the sample containers with appropriate, airtight caps.
6. Label each sample container with a field number and complete a chain of custody.

NOTE: Volatile organic samples are not collected in this manner. Samples for VOC's must be collected as simultaneous, discrete grab samples.

8.7.2 Duplicate Sample Collection

1. Collect two samples in rapid succession.
2. Preserve where required.
3. Mix thoroughly.
4. Seal the sample containers with appropriate, airtight caps.
5. Label each sample container with a field number and complete a chain of custody.

9.0 GROUNDWATER AND DRINKING WATER SAMPLING

9.1 GROUNDWATER AND DRINKING WATER SAMPLING EQUIPMENT

Equipment type	Purpose	Component(s)	Allowable Parameter Groups
Bailers (disposable and non-disposable)	Purging	Teflon® & SS	All parameter groups
	Sampling	Teflon®	All parameter groups
Peristaltic Pump[1]	Purging[2]	Tygon Tubing	All parameter groups except organics
	Purging	Teflon®	All parameter groups
		Silastic Rubber	All parameter groups except organics
ISCO Bladder Pump[3]	Sampling	Stainless Steel, Teflon®	All parameter groups

[1] New or dedicated tubing must be used at individual monitoring well sites.
[2] If sample is not collected immediately after evacuation, tubing shall be withdrawn from the well prior to pump being turned off to prevent back flowing into the well.
[3] Pump will be cleaned after each use.

9.2 GENERAL GROUNDWATER SAMPLING

Groundwater sampling is necessary for a number of purposes. These include, but are not limited to, evaluating potable or industrial water sources, mapping contaminant plume movement at a land disposal or spill site, RCRA compliance monitoring (landfills), or examining a site where groundwater contamination may have or may be occurring.

Normally, groundwater is sampled from a permanent monitoring well. However, this does not exclude collection of samples from a sinkhole, pit, or other drilling or digging site where groundwater is present.

Monitoring wells are not always at the optimum. In these situations, additional wells may need to be drilled. Experienced, knowledgeable individuals (hydrologists, geologists) are needed to site the well and oversee its installation so that representative samples of groundwater can be collected.

ESC utilizes the procedures being reviewed in this section. Further guidance is available in the *RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD)*; ESC field personnel, at a minimum meet, and when possible exceed, the requirements of this document.

9.3 Measurement of Well Water Level and Stagnant Water Volume Calculation

The sampling and analysis plan provides for measurement of standing water levels in each well prior to each sampling event. Field measurements include depth to standing water surface and total depth of the well. This data is then utilized to calculate the volume of stagnant water in the well and provide a check on the integrity of the well (e.g., silt buildup). The measurement should be taken to 0.01 foot when possible. A battery powered level sensor is used to measure depth to the surface of the groundwater. Equipment shall be constructed of inert materials and will be cleaned per sample equipment cleaning procedures prior to use at another well. Field data is recorded on the Monitoring Well Data Sheet (Figure 2).

9.3.1 Procedure for Water Level Measurement

1. Clear debris from area around well or lay plastic sheathing around well pad.
2. Remove protective casing lid.
3. Open monitoring well lid.
4. Lower the clean water level indicator probe down into the well. A beep will sound upon contact with the water surface. False readings can be made from the wetted side of the well so it is necessary to check the level several times until a consistent reading is achieved. Record the distance (to the nearest 0.01 ft.) from the top of the well casing to the water surface on the Monitoring Well Data Sheet.
5. Continue to lower the probe until it reaches the well bottom. Record the distance (to the nearest 0.01 ft) from the top of the well casing to the bottom of the well on the Monitoring Well Data Sheet.
6. All water level and well depth measurements are made from the top of the well casing unless specified otherwise by the project manager or DER.
7. The wetted depth is obtained by subtracting total well depth from the surface level depth.

9.3.2 Calculating Water Volume

Total volume of standing water in a well is calculated by the following formula:

$$V = \pi r^2 h \times 7.48 \text{ gallons/ft}^3$$

where;

V	=	volume of standing water in the well (gallons)
r	=	radius of well (ft)
h	=	depth of water column in the well (ft)
π	=	3.14
7.48	=	conversion factor

9.4 WELL EVACUATION: WELLS WITHOUT IN-PLACE PLUMBING

Water standing in a well may not be representative of actual groundwater conditions. The standing water in a well should be removed to allow representative formation water to supplant the stagnant water. The evacuation method depends on the hydraulic characteristics of the well but the following general rules apply.

The total amount of water purged must be recorded. Therefore, the volume must be measured during the purging operation. This may be determined by:

1. Collecting the water in a graduated or known volume container (i.e., bucket);
2. Calculate the volume based on the pump rate; however pump rate may not be constant and field personnel should be aware of this;
3. Record the time that the actual purging begins in the field record.

Purging is considered complete if any one of the following criteria is satisfied:

1. Three well volumes are purged and field parameters (pH, temperature, conductivity) stabilize within 5% in consecutive readings at least 5 minutes apart. If field parameters have not stabilized after 5 well volumes, the purging is considered complete and sampling can begin.
2. Five well volumes are purged with no monitoring of field parameters.
3. At least one fully dry purge. A second dry purge may be necessary in some situations.

FIGURE 2
MONITORING WELL DATA SHEET

Site location:

ESC Project name/#:

Well Number	Depth to water surface (ft)	Depth to bottom of well (ft)	Length of water column (ft)	Volume of water evacuated (gal)	Time/date

Well Number	Temperature (^{0}F)	pH (S.U.)	Conductivity (Tmho/cm)	Time/Date

Well casing material / diameter:

Sampled by / signature:

NOTES / CALCULATIONS:

Except for low recovery wells, all wells are sampled within 6 hours of purging. Low recovery wells may be sampled as soon as sufficient sample matrix is available or up to 10 hours after purging. Wells that do not recover sufficiently within 10 hours should not be sampled.

Purging equipment includes Teflon® or stainless steel bailers or a peristaltic pump. Any fuel-powered pumping units are placed downwind of any sampling site. If purging equipment is reused, it is cleaned following standard procedures. Disposable latex gloves are worn by sampling personnel and changed prior to starting work at each sampling site.

If bailed water is determined to be hazardous, it should be disposed of in an appropriate manner.

The Florida Department of Environmental Regulation requires that during purging of the well, the purging device should be placed just below the surface of the water level and be lowered with the falling water level. For high yield wells, three casing volumes should be evacuated prior to collecting samples. Purging should be conducted at a rate to minimize agitation of the recharge water. Conductivity, pH, and temperature measurement during purging is necessary to monitor variability of the groundwater. **Samples should be collected within 6 hours of purging high yield wells.**

Low-yield wells (incapable of yielding three casing volumes) should be evacuated to dryness at a rate that does not cause turbulence. When the well recovers sufficiently, the first sample should be analyzed for pH, temperature, and conductivity. When recovery exceeds two hours, the sample should be collected as soon as sufficient volume is available. **If recovery is longer than 10 hours, the well should not be tested**. The project manager may wish to review available information to determine if obtaining a representative sample is possible.

9.4.1 Procedure for Well Evacuation: Teflon® Bailer

1. Clear the area around the well pad; cover with plastic if necessary.
2. Slowly lower the bailer to the water surface and remove it when full.
3. Reel or pull bailer to the surface using caution to not allow the lanyard (cable or string) to touch the ground.
4. Use the bailer volume and number of bails removed to determine volume of water removed. Excess hazardous material should be poured into a container for later disposal.
5. Repeat steps 2 and 3 until 1.5 well volumes have been removed.
6. Begin monitoring for pH, temperature, and conductivity. Record values on the Monitoring Well Data Sheet. Discard the sample into the collection pail. Purge until the change between samples of each parameter is less than 5%.
7. Continue until at least three well volumes have been evacuated and the parameters pH, temperature, and conductivity are within 5 percent, or until a low yield well has been evacuated to dryness.
8. Record date and time the well was purged on the Monitoring Well Data Sheet.

NOTE: For wells sampled in the State of Florida, three well volumes are purged prior to pH, temperature, and conductivity screening. Following evacuation of three well volumes, purge water is screened for these parameters at regular intervals until two consecutive measurements are within 5 percent. The intervals may be time-based (at least 5 min) or represent a portion of the well volume (at least 0.5 well volume).

Compliance with more stringent local, State, or Regional guidelines is observed where required.

9.4.2 Procedure for Well Evacuation: Peristaltic Pump

1. Clean area around the well pad.
2. Install the appropriate length of Tygon® or Teflon® tubing into the pump mechanism.
3. Insert the uncontaminated sampling end of the tubing into the well surface.
4. Connect the pump to the power supply.
5. Operate the pump at a flow rate that does not cause excessive agitation of the replacement water.
6. Determine the pump flow rate.
7. Purge until 1.5 well volumes have been evacuated.
8. Collect samples at a rate of one per well volume evacuated. Monitor these samples for pH, temperature, and conductivity. Record these measurements on the Monitoring Well Data Sheet. Monitor until the difference in each parameter is less than 5 percent.
9. Continue purging until three well volumes have been evacuated and the parameters pH, temperature, and conductivity are within 5 percent, or until a low yield well has been evacuated to dryness.
10. Record the date and time the well was purged on the Well Sampling Field Data Sheet.

9.5 PURGING TECHNIQUES: WELLS WITH IN-PLACE PLUMBING

9.5.1 General

The volume to be purged depends on whether the pumps are running continuously or intermittently and how close to the source samples can be collected. If storage/pressure tanks are present, a volume must be purged to totally exchange the volume of water in the tank.

9.5.2 Continuously Running Pumps

For continuously running pumps, the well should be purged by opening the valve and allowing it to flush for 15 minutes, if the well volume is unknown. If the sample is collected after a holding tank, the volume of the tank should also be purged.

9.5.3 Intermittently Running Pumps

Wells are purged at the maximum rate for at least 15 minutes. Monitoring of field parameters continues until two consecutive measurements within 5% are measured at 5-minute intervals.

9.6 SAMPLE WITHDRAWAL

Technique for withdrawal is dependent on the parameters to be analyzed. To collect a representative sample and minimize the possibility of sample contamination:

- Use Teflon® or stainless steel sampling devices when organics are an analyte of concern.
- Use dedicated tubing or samplers for each well. If a dedicated sampler is not available, clean the sampler between sampling events. Analyze equipment blanks to ensure cross-contamination has not occurred.

The preferred sample collection order is as follows (decreasing volatility):

1. Volatile organic compounds (VOCs)
2. Extractable Organics (includes Total Recoverable Petroleum Hydrocarbons [TRPH], Oil & Grease, Pesticides and Herbicides)
3. Total metals
4. Dissolved metals
5. Microbiological
6. Inorganics (includes Nutrients, demands, and Physical Properties)
7. Radionuclides

The following items are acceptable sampling devices for all parameters:

- A gas-operated, Teflon® or stainless steel squeeze pump (also referred to as a bladder pump with adjustable flow control) should be dedicated or completely cleaned between sampling events. If it is dedicated, the protocols on use, flow rates, and flow controls should be discussed.
- A Teflon® bailer with check valves and a bottom emptying device. Dedicated or disposable bailers should not be cleaned between purging and sampling operations.

ESC generally supplies sampling devices for wells sampled by ESC. However, some customers have wells equipped with dedicated sampling devices. All dedicated equipment is cleaned between sampling events with the exception of dedicated pump systems or dedicated pipes that are never removed. ESC evaluates the device and the project manager approves/disapproves of the dedicated device prior to sampling.

If sampling includes dissolved parameters, samples are filtered in the field in the following manner:

1. Use a one piece, molded, in-line high capacity disposable 1.0 micron filter when collecting samples for dissolved trace metals analysis. Use a 0.45 micron filter when sampling for all other (i.e., orthophosphorous, silica, etc.) dissolved parameters.
2. Filter material should be non-contaminating synthetic fibers.
3. Filter should be placed on the positive pressure side of the peristaltic pump.
4. If well is deeper than 25 feet; a submersible bladder pump may be necessary to bring the sample to the surface. Samples shall not be collected in an intermediate container.
5. At least one filtered equipment blank, using deionized water, must be collected and analyzed.
6. The sample is preserved as required following filtration.
7. Unfiltered samples are collected in conjunction with filtered samples.

NOTE: Filtered samples are collected only at the request of DER and will not be collected for turbid samples only.

9.6.1 Sample Removal: With In-Place Plumbing

Samples should be collected following purging from a valve or tap as near to the well as possible, and ahead of all screens, aerators, filters, etc. Samples shall be collected directly into the sampling containers. Flow rate should not exceed 500 mL/min.

9.6.2 Sample Removal: Without In-Place Plumbing

1. Following purging, collect the sample and pour it directly from the bailer into the sample container. If a peristaltic pump is used, pump the sample directly into the container. Collect the samples in order of decreasing volatility.
2. Measure the conductivity, pH, and temperature of the samples and record the results on the Monitoring Well Data Sheet.
3. If a bailer is not dedicated, clean field equipment using standard procedures. Collect blanks at a rate of one per type of equipment cleaned. If a piece of equipment is cleaned more than twenty times, collect blanks at a rate of 10 percent. An equipment blank must be taken and preserved for each analyte method group.
4. If a bailer is used to collect samples, replace the bailer string. Take precautions not to allow the string to touch the ground. Dispose of the used string properly. If Teflon® or stainless steel cable is used, clean according to standard procedures and do not let it touch the ground.
5. Replace the well cap and close and lock the protective casing lid.

9.7 SPLIT AND DUPLICATE SAMPLE COLLECTION

Split samples measure variability between analysts, methods, and laboratories and are taken as subsamples from a single sample. Duplicate samples measure variability inherent in the collection method or waste stream and are obtained in close succession during the same sampling event.

9.7.1 Split Sample Collection

1. Collect sufficient volume in a container constructed of appropriate materials. The volume should be more than twice the volume required for one sample.
2. Preserve as necessary.
3. Mix well.
4. Alternately decant 10% of the sample volume into each container and mix well.
5. Continue until each container is filled with an adequate sample volume.
6. Seal the containers, assign a field number, and complete the chain of custody.

9.7.2 Duplicate Sample Collection

1. Collect two samples in rapid succession into separate containers.
2. Preserve as necessary.
3. Mix well.
4. Seal the containers, assign a field number, and complete the chain of custody.

9.8 DRINKING WATER SAMPLING

9.8.1 General Concerns

Containers and preservatives must be selected prior to sampling.

- Containers and preservatives shall comply with Tables 1 and 2.
- It is recommended that the appropriate preservative be added to the container by the laboratory.

9.8.2 Sampling Drinking Water Wells

1. Purging and sampling should be from a spigot closest to the wellhead.
   - The spigot should be located before the holding tank and filters. If this is not possible, the holding tank must also be purged.
   - All aerators and filters should be removed if possible.
2. Depending on the running schedule of the well and the placement of the pressure tank, the system is purged as described in Section 9.5.
3. If volume of the pressure tank is not known, the well is purged for at least 15 minutes at maximum rate.
4. The flow is reduced to approximately 500 mL/minute.

5. Sample containers with no preservatives:
   - The interior of the cap or the container should not come in contact with anything.
   - The sample container is rinsed and the water is discarded.
   - Containers are not rinsed if collecting for oil and grease, total recoverable hydrocarbons, volatile organics (including trihalomethanes) or microbiologicals.
   - The container should be tilted to minimize agitation.
6. Sample containers with preservatives:
   - The above protocol is followed but **DO NOT** rinse the container.
   - The open end of the container should be held away from the face while filling.
   - The container should be gently tipped several times to mix the preservatives.
7. Place the bottle in a plastic bag and cool to 4°C.

9.8.3 Sampling Drinking Water within a Facility/Residence for the Lead/Copper Rule

1. The appropriate sampling point depends on whether the sample is being taken to monitor compliance with Drinking Water Regulations for Lead and Copper. If so, the sample must be taken from a cold water tap in the kitchen or bathroom of residential housing or from an interior tap where water is used for consumption in a non-residential building.
2. Samples must be collected after the water has stood in the pipes for at least six hours.
3. THE SYSTEM SHOULD NOT BE FLUSHED.
4. The first flush should be collected immediately into the sample container. DO NOT RINSE THE CONTAINER PRIOR TO COLLECTING THE SAMPLE.
5. The container should be tilted to minimize agitation.
6. If the container contains preservative, hold the open end away from the face.
7. If the container does not contain preservative, add preservative as needed.
8. Replace cap and gently tip the container several times to mix the preservatives.
9. Place in a plastic sample bag.

9.8.4 Sampling a Lead Service Line in a Facility/Residence for the Lead/Copper Rule

1. When sampling for compliance, the sampling point is normally designated by the permit or the municipality.

2. For Lead & Copper samples, each sample shall have stood in the line for at least six hours and shall be collected in one of the following ways:
   a. At the tap, after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based upon the inner diameter and length of the pipe between the tap and the service line.
   b. By tapping directly into the service line.
   c. In a single-family residence, allow the water to run until a significant temperature change indicates water standing in the service line is being sampled.
3. The flow shall be reduced to less than 500 mL/min before collecting samples.
4. Test for the presence of residual chlorine using residual chlorine indicator strips or a Hach DR-100 chlorine analyzer.
5. If residual chlorine is present and the parameter being analyzed requires removal of chlorine, collect the sample in the appropriate sample container(s) using the required preservatives.
   a. Add 0.008% $Na_2S_2O_3$ or 100mg of $Na_2S_2O_3$ per 1L of sample water directly into the sample container.
   b. After replacing the cap, tip the container several times to mix the preservative.

10.0 SOIL SAMPLING

Soil samples are preserved as per Section 14. When compositing subsamples, the quantity of each subsample used is measured and recorded in the field logbook.

10.1 SAMPLING EQUIPMENT

Type	Use	Materials	Allowable Parameter Groups[1]
Hand Auger (Bucket type)	Sampling	PVC	All parameter groups except VOC's, extractables and organics
Encore™ Sampler	VOC soil subsampling	Teflon®	VOC's only
Split Spoons	Sampling	Carbon Steel	All parameter groups
Trowel, Spatula	Sampling and Compositing*	Chrome-Plated Steel	All parameter groups
Spoons	Sampling and Compositing*	Stainless Steel	All parameter groups
Shovel	Sampling	Carbon Steel	All parameter groups
Mixing Pan	Compositing*	Pyrex & Aluminum	All parameter groups except metals in aluminum pan

[1] Carbon steel & Chrome-plated steel tools may be used for collecting soils where trace metal concentrations are not a concern. When these tools are used, samples should be taken from soils not in contact with the tool surface.

* Compositing is not suitable for VOC's

10.2 HAND AUGER SAMPLING PROCEDURE

This procedure is used when only relatively shallow samples are required or when the use of heavy equipment is not practical. The hand auger may be used to collect samples of soils or other materials at various depths by adding extensions as necessary.

1. Remove surface debris from the location of the sampling hole using a clean shovel or spoon.
2. Disturbed portions of soil should be discarded and not used as part of the sample.
3. Using a clean auger, drill to the desired sample depth. Confirm depths using a tape measure or other appropriate device.
4. Use a clean planer auger to clean and level the bottom of the boring.
5. All grab samples should be mixed thoroughly prior to placement in containers (except VOCs).
6. Using a clean auger, extract the desired sample. Subsampling is performed for VOC sample collection using an Encore™ sampling device. Once the core sample is collected, additional samples should be taken using an Encore™ sampler, either 5g or 25g, capped, sealed, and immediately cooled to 4ºC. The holding time for this method is 48 hours. Alternatively, weigh 5g of sample into a pre-weighed vial (with a Teflon® lined screw cap) containing 5mL sodium bisulfate solution and a magnetic stir bar, cap, and then ice to 4ºC. The holding time for this method is 14 days.
7. If less than the collected volume of material is desired or if multiple containers are required, subsampling shall be conducted. The collected material shall be placed in a clean mixing pan and thoroughly mixed using a clean, stainless steel spoon. The mixed material will then be quartered, removed and recombined before samples are collected. For clay soils, representative aliquots of the entire sample should be removed from the auger using stainless steel spoons. Samples for chemical analyses shall not be collected from auger flights or cuttings from hollow stem auger flights. Samples used for vapor meter determinations will not be used for trace contaminant analyses.
8. Samples should then be labeled. The depth range from which the samples were taken should be included in the sample description.
9. Repeat steps (2) through (6) as necessary to obtain samples at all desired depths.
10. When preparing composite samples, the quantity of each subsample shall be measured and recorded in the field logbook.

10.3 SPLIT AND DUPLICATE SAMPLE COLLECTION

Split samples measure variability between analysts, methods, and laboratories and are taken as subsamples from a single sample. This is unlike duplicate samples that measure variability inherent in the collection method or waste stream and are obtained in close succession during the same sampling event. True split samples are difficult to collect for soils, sediment, and sludge under field conditions. Split samples for these materials are therefore considered duplicate samples.

The collection procedure is as follows:

1. Collect the appropriate volume of sample into a clean disk constructed of a non-reactive material.
2. Mix the material with a clean utensil and separate into 4 to 10 equal portions.
3. Alternate placing a portion of the subdivided material into each container.
4. Repeat until each container is filled.
5. Assign each container a field sample number and complete the chain of custody.

11.0 WASTE SAMPLING

11.1 SAMPLING EQUIPMENT

Type	Use	Materials	Allowable Parameter Groups[1]
Shovel	Sampling	Carbon Steel	All parameter groups except metals
Split Spoons	Sampling	Carbon Steel	All parameter groups except metals
Trowel, Spatula	Sampling and Compositing*	Stainless Steel	All parameter groups
Spoon	Sampling and Compositing*	Stainless Steel	All parameter groups
Drum Pump	Sampling	Polypropylene	All parameter groups
Mixing pan	Compositing*	Pyrex or aluminum	All parameter groups except metals in aluminum pan
Coliwasa	Sampling	Glass	All parameter groups

[1]Carbon steel tools may be used for collecting wastes when trace metal concentrations are not a concern.
*Compositing is not suitable for VOC's

11.2 GENERAL

This section discusses the collection of samples from drums, tank trucks, and storage tanks, and samples from waste piles and landfills. All ESC personnel consider sampling from closed containers as a hazardous operation.

11.2.1 Specific Quality Control Procedures for Sampling Equipment

Sampling equipment used during waste sampling must be cleaned as specified in Section 12 of this manual before being returned from the field to minimize contamination.

Contaminated disposable equipment must be disposed of as specified in the sampling plan.

All field equipment is cleaned and repaired before being stored at the conclusion of a field study. Special decontamination procedures may be necessary in some instances and is developed on a case-by-case basis. Any deviation from standard cleaning procedures and all field repairs is documented in field logbooks. Equipment that has not been properly cleaned must be tagged and labeled.

11.2.2 Collection of Supplementary Information

The collection of supplementary data is important when collecting waste samples. Any field analyses are recorded in field logbooks. Sketches of sampling locations and layout are documented in the logbooks. Photographs are used extensively.

11.3 Open and Closed Container Sampling

11.3.1 General

When sampling containers, open containers should be sampled first since they generally present less of a hazard. Closed containers must be considered as extremely hazardous. Due to the dangers involved with container sampling, the sampling of drums or other containers containing either unknown materials or known hazardous materials are considered a hazardous duty assignment.

One problem with container sampling is stratification and/or phase separation. Care must be taken to ensure that the sample collected is representative. If only one layer or phase is sampled, this should be noted when interpreting analytical results.

If no stratification is present, representative samples may be composited by depth. When a drum or cylindrical container is standing vertically, depth compositing provides a good quantitative estimate of the containers contents. In other cases where containers are tipped, horizontal, deformed, etc., and stratification may not be present, vertical compositing provides at least a qualitative sample.

11.3.2 Sampling Equipment

The following equipment is available for use in collecting waste samples: barrel bung wrenches, adjustable wrenches, etc.; coliwasa samplers for drum sampling; and peristaltic pumps for liquid waste sampling from containers.

11.3.3 Sampling Techniques

Containers containing unknown materials or known hazardous materials are opened using only spark proof opening devices from a grounded container.

The coliwasa sampler is a single use glass sampler, consisting of an outer glass tube with one end tapered and a separate inner glass tube with a small bulb on one end. The outer tube is slowly lowered into the drum, tapered end first. Slowly lowering the tube allows the liquid phases in the drum to remain in equilibrium. The inner glass tube is inserted into the outer tube. After both inner and outer tubes are inserted into the drum to be sampled, the inner tube bulb end is pressed gently against the tapered end of the outer tube, forming a seal. Both tubes are withdrawn from the drum and the ends of the tubes are held over the sample container.

Drum samples can also be collected using a length of glass tube (1/2-inch or less inside diameter). The tube is inserted into the drum as far as possible and the open end is sealed to hold the sample in the tube. The sample is then placed in the appropriate container. Sample volumes are the absolute minimum required.

Tank truck and storage tank samples may be collected from access ports on top of these tanks or trucks using the above techniques. Tank trucks are often compartmentalized, and each compartment should be sampled. Sampling from discharge valves is not recommended due to stratification possibilities and possibilities of sticking or broken valves. If the investigator must sample from a discharge valve, the valving arrangement of the particular tank truck being sampled must be clearly understood to ensure that the contents of the compartments of interest are sampled. The investigator must realize that samples obtained from valves may not be representative.

If stratification or phase separation of waste samples is suspected, the sample collected should be representative of container contents. Samples should be depth composited when possible and number and types of layers shall be noted when interpreting analytical results.

11.4 WASTE PILES AND LANDFILLS

11.4.1 General

Waste piles consist of sludge and other solid waste, liquid waste mixed with soil, slag, or any type of waste mixed with construction debris, household garbage, etc. The sampling personnel must be aware that landfills were not and are often still not selective in the types of materials accepted. Sampling at landfills could involve sampling operations that are potentially dangerous to sampling personnel.

11.4.2 Sampling Locations

Sampling locations should be selected that yield a representative sample of the waste. Exceptions are situations in which representative samples cannot be collected safely or when the team is purposely determining worst-case scenarios.

11.4.2.1 Waste Piles

A representative sample from a small waste pile can be obtained by collecting a single sample. Collecting representative samples from large waste piles requires a statistical approach in selecting both the numbers of samples and sample location. A discussion of statistical methods is outlined in the *Test Methods for Evaluating Solid Waste (SW-846)* issued by the EPA Office of Solid Waste and Emergency Response.

11.4.2.2 Landfills

Representative samples from landfills are difficult to achieve to due to the heterogeneous nature of the wastes. A statistical approach should be used in selecting both the number of samples and the sample location. Statistical methods are given in *Test Methods for Evaluating Solid Waste (SW-846)* issued by the EPA Office of Solid Waste and Emergency Response. Landfills often generate leachate at one or more locations downgradient of the fill material that can provide some insight into the materials contained in a landfill that are migrating via groundwater.

11.4.3 Sampling Techniques

All samples collected should be placed into a Pyrex® or aluminum mixing pan and mixed thoroughly. Samples for volatile organic compounds analyses must not be mixed or composited. Stainless steel spoons or scoops should be used to clear away surface materials before samples are collected. Near surface samples can then be collected with a clean stainless steel spoon. Depth samples can be collected by digging to the desired depth with a carbon steel shovel or scoop and removing the sample with a stainless steel spoon.

12.0 STANDARD CLEANING PROCEDURES

12.1 GENERAL

12.1.1 Introduction

ESC personnel use the procedures outlined in this section to clean field equipment prior to use. Ideally, a sufficient amount of clean equipment is carried to the field so that the project can be conducted without the need for field cleaning. This is not always the case. ESC's policy regarding cleaning field equipment is as follows:

1. Equipment used in the field must be thoroughly cleaned in a controlled environment using prescribed procedures. This minimizes the potential for contaminants being transferred to equipment, vehicles, and the laboratory.
2. All equipment is rinsed immediately with tap water after use, even if it is to be field cleaned for other sites.
3. If equipment is used only once (i.e., not cleaned in the field), it is labeled as “dirty or “contaminated equipment in the field and transported separately from clean equipment.
4. All cleaning procedures are documented. Field decontamination is documented in the field records. These records specify the type of equipment cleaned and the specific protocols that are used. In-house cleaning records must identify the type of equipment, date it was cleaned, SOP used, and person that cleaned it.
5. Unless justified through documentation (i.e., company written protocols and analytical records) and historic data (i.e., absence of analytes of interest in equipment blanks), the protocols in Sections 12.1.2 through 12.7.11 are followed without modification.
6. All field sampling equipment is pre-cleaned in-house.

12.1.2 Cleaning Materials

Use a phosphate-free, laboratory detergent such as Liquinox®. The use of any other detergent is noted in field logbooks and summary reports.

Ten percent nitric acid solution is made from reagent-grade nitric acid and deionized water.

The standard cleaning solvent used is pesticide-grade isopropanol. Other solvents (acetone and/or hexane) may be substituted as necessary. The use of other solvents must be documented in field logbooks and summary reports.

Tap water may be used from any potable water system. Untreated water is not an acceptable substitute for tap water.

Deionized water is tap water that has been passed through a deionizing resin column and should contain no inorganic compounds at or above analytical detection limits. Organic-free water is tap water that has been de-ionized and treated with activated carbon. Organic-free water should contain no detectable levels of organic compounds, and less than 5 ug/L of VOCs.

Analyte-free water is water in which all the analytes of interest and all interferences are below the method detection limits. Analyte-free water is always used for blank preparation and for the final in-house decontamination rinse.

Substitution of a higher grade water (i.e., deionized or organic-free water for tap water) is permitted and need not be recorded. Solvent, nitric acid, detergent, and rinse water used to clean equipment shall not be reused.

12.1.3 Marking Clean Equipment

Equipment that is cleaned by these methods is marked with the date and time that the equipment was cleaned.

12.1.4 Marking Contaminated or Damaged Field Equipment

Field equipment that needs repair is tagged and repairs or symptoms noted on the tag. Field equipment that needs cleaning **will not** be stored with clean equipment. All wrapped equipment not used in the field may be placed back in stock after equipment is inspected to ensure that contamination has not taken place.

12.1.5 Decontamination of Equipment Used With Toxic or Hazardous Waste

Equipment used to collect hazardous or toxic wastes or materials from hazardous waste sites, RCRA facilities, or in-process waste streams is decontaminated prior to leaving the site. This decontamination procedure consists of washing with laboratory detergent and rinsing with tap water. More stringent procedures may be required depending on the waste sampled.
If equipment is heavily contaminated, an acetone or acetone/hexane/acetone pre-rinse may be necessary prior to regular decontamination procedures. It is not recommended that this type of cleaning be performed in the field.

12.1.6 Disposal of Cleaning Materials

See Section 16.

12.1.7 Safety Procedures for Cleaning Operations

All applicable safety procedures are followed during cleaning operations. The following precautions are taken during cleaning operations:

- Safety glasses or goggles, gloves, and protective clothing are worn during all cleaning operations.
- Solvent rinsing operations are conducted under a hood or in an open, well ventilated area.
- No eating, smoking, drinking, chewing, or hand to mouth contact is permitted during cleaning operations.

12.1.8 Storage of Field Equipment

All clean field equipment is stored in a designated, contaminant-free area.

12.2 Quality Control Procedures for Cleaning

12.2.1 General

This section establishes quality control methods to monitor the effectiveness of the equipment cleaning procedures. The results of these methods are monitored by the ESC Quality Assurance Department. All quality control procedures are recorded in a logbook and maintained in a quality assurance file. If contamination problems are detected, the ESC QA Department determines the cause(s) of the problem(s) and takes immediate corrective action.

12.2.2 Rinse Water

The quality of water used is monitored once per quarter by placing water in standard, pre-cleaned sample containers and submitting them to the ESC laboratory for analysis. Organic-free water is also submitted for analyses of the various organic compounds.

12.3 Procedures for Cleaning Teflon® or Glass Equipment Used in the Collection of Samples for Trace Organic Compounds and/or Metals Analyses

1. Equipment is washed with laboratory detergent and hot water using a brush to remove any particulate matter or surface film. If oil, grease, or other hard to remove residues are present on the equipment, an acetone/hexane/acetone pre-wash and/or steam cleaning may be necessary.
2. Rinse the equipment with hot tap water.
3. Rinse or soak, if necessary, equipment with a 10% nitric acid solution. If nitrogen-containing compounds are analytes of concern, hydrochloric acid must be used as a substitute or subsequent equipment rinse.
4. Rinse equipment with tap water.
5. Rinse equipment with deionized water.
6. Rinse equipment twice with solvent and allow to dry.
7. If equipment cannot be cleaned effectively, discard properly.
8. Wrap equipment in aluminum foil. Seal in plastic and date.

12.4 Procedures for Cleaning Stainless Steel or Metal Sampling Equipment Used in Trace Organic and/or Metals Sample Collection

1. Equipment is washed with laboratory detergent and hot water using a brush to remove any particulate matter or surface film. If oil, grease, or other hard to remove materials are present, a acetone/hexane/acetone pre-wash and/or steam cleaning may be necessary.

2. Rinse equipment with hot tap water.
3. Rinse equipment with deionized water.
4. Rinse equipment twice with solvent and allow to dry.
5. If equipment cannot be cleaned effectively, discard properly.
6. Wrap equipment in aluminum foil. Seal in plastic and date.

12.5 CLEANING PROCEDURES FOR AUTOMATIC SAMPLING EQUIPMENT

12.5.1 General

All automatic wastewater samplers are cleaned as follows:

- The exterior and accessible interior portions of automatic samplers is washed with Liquinox and rinsed with tap water.
- The electronics casing are cleaned with a clean damp cloth.
- All vinyl sample tubing is discarded after each use.
- Teflon® tubing is cleaned using procedures found in Section 12.6.2.
- Silastic pump tubing is cleaned after each use, if possible. Tubing is cleaned using cleaning procedures specified in Section 12.6.1 of this document. Tubing is checked on a regular basis and will be changed if it has become discolored or loses elasticity.

12.5.2 Reusable Glass Composite Sample Containers

1. If containers are used to collect samples that contain hard to remove materials (i.e., oil and grease) it is rinsed as necessary with reagent grade acetone prior to the detergent wash. If material cannot be removed, the container is discarded.
2. Wash containers thoroughly with hot tap water and Liquinox and rinse thoroughly with hot tap water.
3. If metals are to be sampled, rinse with 10% nitric acid. If nutrients are to be sampled, follow with a 10% hydrochloric acid rinse.
4. Rinse thoroughly with tap water.
5. Rinse thoroughly with DI water.
6. If organics are to be sampled, rinse twice with isopropanol and allow to air dry for 24 hours or more. Cap the container with the decontaminated Teflon® lined lid.
7. After use, rinse with tap water in the field and cover to prevent drying of material onto the interior surface.
8. Containers that have a visible scale, film, or discoloration after cleaning or were used at a chemical manufacturing facility should be properly discarded at the conclusion of the sampling activities.

12.5.3 Reusable Plastic Composite Sample Containers

1. Wash containers with hot tap water and laboratory detergent using a bottlebrush to remove particulate matter and surface film.
2. Rinse containers with hot tap water.
3. Rinse containers with 10% nitric acid. If nitrogen containing compounds are analytes of concern, hydrochloric acid must be used as a substitute or subsequent equipment rinse.
4. Rinse containers with tap water.
5. Rinse containers with deionized water.
6. Cap with aluminum foil.
7. Plastic sample containers used at facilities that produce toxic compounds will be properly disposed of at the conclusion of the sampling activities. Containers that have a visible film, scale, or other discoloration remaining after cleaning will be discarded.

12.5.4 Plastic Sequential Sample Bottles for Automatic Sampler Base

1. Rinse bottles in field with potable or de-ionized water when possible.
2. Wash in dishwasher at wash cycle, using laboratory detergent cycle, followed by tap and deionized water rinse cycles. Alternatively, handwash using the same procedure.
3. Rinse with 10% nitric acid. If nitrogen containing compounds are analytes of concern, hydrochloric acid must be used as a substitute or subsequent equipment rinse.
4. Rinse with tap water.
5. Replace bottles in sampler base; cover with aluminum foil before storing.

12.6 CLEANING PROCEDURES FOR SAMPLING TUBING

12.6.1 Silastic Rubber Pump Tubing Used In Automatic Samplers

Silastic pump tubing used in automatic samplers need not be replaced in pumps where the sample does not contact the tubing, where the sampler is being used solely for purging purposes (i.e., not being used to collect samples). Tubing must be changed on a regular basis, if used for sampling purposes, and should be cleaned in this manner:

1. Flush tubing with laboratory grade detergent and hot tap water
2. Rinse thoroughly with hot tap water
3. Rinse thoroughly with DI water
4. If used to collect metals samples, the tubing is flushed with 1+5 nitric acid, followed by a thorough rinsing with DI water
5. Install the tubing in the automatic wastewater sampler
6. Cap both ends with aluminum foil or equivalent

Tubing should always be replaced at automatic sampler manufacturer's recommended frequencies. If tubing cannot be adequately cleaned, it is discarded.

12.6.2 Teflon® Tubing

New Teflon® tubing is pre-cleaned as follows:

1. Rinse outside of the tubing with pesticide-grade solvent.
2. Flush interior of the tubing with pesticide-grade solvent.
3. Let dry overnight in drying oven or equivalent.
4. Wrap tubing in aluminum foil and seal in plastic.

Reused tubing is transported to the field in pre-cut and pre-cleaned sections. Field cleaning of Teflon® is not recommended. The following steps describe in-house cleaning procedures:

1. Exterior of tubing must be cleaned first by soaking in hot, soapy water in a stainless steel or non-contaminating sink. Particulate may be removed with a brush.
2. Clean inside of tubing ends with a small bottlebrush.
3. Rinse surfaces and ends with tap water.
4. Rinse surfaces and ends with nitric acid, tap water, isopropanol, and analyte-free water.
5. Place on fresh aluminum foil, connect all sections with Teflon® couplings.
6. Cleaning configuration:
   a. Cleaning solutions are placed in a clean, 2-liter glass jar.
   b. Place one end of tubing in the solution, the other in the **INFLUENT** end of a peristaltic pump.
   c. Effluent from the pump can be recycled through the glass cleaning solution jar. All cleaning solutions can be recycled EXCEPT the final isopropanol and analyte-free water rinses.
7. The above configuration is used as follows:
   a. Pump generous amounts of hot, soapy water through the tubing.
   b. Follow this with tap water, 10% nitric acid, tap water, isopropanol, and analyte-free water.
   c. The nitric acid and isopropanol rinses should be allowed to remain in the tubing for 15 minutes with the pump shut off then continue with subsequent rinses
   d. Leave any couplings in and connect or cover the remaining ends.
8. After cleaning the interior, rinse the exterior with analyte-free water.
9. The cleaned lengths are wrapped in aluminum foil and stored in a clean, dry area until use.

12.7 FIELD EQUIPMENT CLEANING PROCEDURES

12.7.1 General

It is the responsibility of field personnel to properly clean equipment in the field. The following procedures are observed when cleaning equipment in the field.

12.7.2 Conventional Equipment Use

Remove deposits with a brush if necessary. If only inorganic anions are of interest, equipment should be rinsed with analyte-free water and with the sample at the next sampling location prior to collection. Clean equipment for the collection of samples for organic compounds or trace inorganic analyses according to Section 12.7.3.

12.7.3 Equipment Used to Collect Organic Compounds and Trace Metals Samples

1. Clean with tap water and laboratory detergent. If necessary, use a brush to remove particulate and surface films then rinse with tap water.
2. Rinse with 10 to 15% nitric acid solution followed by 10% hydrochloric acid rinse (unless equipment is made of metal) followed by tap water and DI water.
3. Rinse twice with solvent.
4. Rinse with organic-free water and allow to air dry.
5. If organic-free water is unavailable, let air dry. Do not rinse with deionized or distilled water.
6. Wrap with aluminum foil or plastic.

12.7.4 Teflon®, Glass, Stainless Steel or Metal Equipment Used to Collect Samples for Metal Analyses

1. Remove particulate matter and surface films. Clean with laboratory detergent and tap water.
2. Rinse with tap water.
3. Ten percent nitric acid solution (skip 3 and 4 if equipment is made of metal and/or stainless steel).
4. Rinse with tap water.
5. Rinse with deionized water then let air dry.

12.7.5 Instruments Used to Measure Groundwater Levels

1. Wash with laboratory detergent and tap water.
2. Rinse with tap water.
3. Rinse with deionized water.
4. Allow to dry.

12.7.6 Field Filtration Apparatus

1. A new, disposable filtration unit will be used for each site. Filter pore size is dependent on parameter being monitored as per Section 9.6.
2. The peristaltic pump is cleaned as described in Section 12.7.7.
3. Silastic pump tubing is cleaned as described in Section 12.6.1.
4. If Teflon® tubing is used, it is cleaned as described in Section 12.6.2.
5. Other tubing types must be cleaned following the appropriate regimen described in Section 12.6. In general, non-Teflon® type tubing (e.g., HDPE) will not be re-used.

12.7.7 Flow Meters, Above Ground Pumps, Bladder Pumps and Other Field Instrumentation

The exterior of equipment such as flow meters should be washed with a mild detergent and rinsed with tap water before storage. The interior of such equipment may be wiped with a damp cloth.

Other field instrumentation should be wiped with a clean, damp cloth. Meter probes should be rinsed with deionized water before storage.

Equipment desiccant should be checked and replaced as necessary.

Peristaltic pumps used for purging must be free of oil and grease on the exterior. They must be cleaned on the outside with Liquinox and rinsed with tap water followed by DI water.

12.7.8 In-Field Decontamination For Submersible Purging Pump and Tubing

ESC uses the submersible bladder pump listed in Section 9.1 only for purging and not for sample collection. The pump and tubing is decontaminated between wells in the following manner:

1. Interior of the pump and tubing is thoroughly flushed with a soapy water solution.
2. Wipe or scrub the exterior of the pump and tubing as necessary with the appropriate soap solution.
3. Rinse exterior and interior of pump and tubing thoroughly with tap water followed by a deionized water rinse.
4. Allow remaining water to drain from tubing and pump and allow to air dry as long as possible in a contaminant free area before purging the next well.

12.7.9 Shipping Containers

All reusable shipping containers are washed with laboratory detergent, rinsed with tap water, and air dried before storage or re-use. Extremely contaminated shipping containers are cleaned as thoroughly as possible and properly disposed.

12.7.10 Analyte Free Water Containers

Analyte-free water containers can be made of glass, Teflon®, polypropylene, or high density polyethylene (HDPE). Inert glass or Teflon® are recommended for holding organic-free sources of water. Polypropylene can be used when organics are not analytes of concern. HDPE is not normally recommended but is acceptable for use. Water should not be stored in these containers for extended periods. Containers of water should only be used for a single event and should be disposed of at the end of the sampling day. The procedure for cleaning analyte-free water containers is as follows:

1. For new containers, follow instructions in Section 12.3 of this manual. Delete the solvent rinse if containers are made of plastic.
2. Cap with Teflon® film, aluminum foil, or the Teflon® lined bottle cap (aluminum foil or Teflon® film may also be used as a cap liner).

If water is being stored in reused containers, the following cleaning procedures should be followed:

1. After emptying, cap the container.
2. Wash exterior of the container with Liquinox and rinse with DI water.
3. Rinse the interior twice with isopropanol unless the container is made of plastic.
4. Rinse the interior thoroughly with analyte-free water.
5. Invert and allow to dry.
6. Fill the container with analyte-free water and cap with aluminum foil, Teflon® film, or a Teflon® lined bottle cap.
7. Water is not stored prior to a sampling event for more than 3 days.

12.7.11 Vehicles

Field vehicles used by ESC personnel should be washed at the conclusion of each sampling event. This should reduce the risk of contamination due to transport on a vehicle. When vehicles are used at hazardous waste sites or on studies where pesticides, herbicides, organic compounds, or other toxic materials are known or suspected to be present, a thorough interior and exterior cleaning is mandatory at the conclusion of the site visit.

Vehicles are equipped with trash containers. ESC personnel are responsible for cleanliness of each vehicle.

13.0 SAMPLE HISTORY

Sample chronology is recorded and kept on the ESC chain of custody, field logbooks and laboratory notebooks. These are discussed in detail in Section 9.0.

14.0 SAMPLE CONTAINERS, PRESERVATION METHODS AND HOLDING TIMES

14.1 GENERAL CONSIDERATIONS

The following section contains information regarding sample containers, preservation methods, and holding times. Refer to SW-846, Table II-1 and Chapter 3, Page 3 for solid waste and RCRA projects and 40 CFR Part 136, Table II for water and wastewater projects.

The provisions of 40 CFR Part 136, Table II take precedence over requirements given in any approved method when sampling in the State of Florida for water and wastewater.

Proper sample preservation is the responsibility of the sampling team and it is their responsibility to assure that all samples are preserved according to 40 CFR Part 136. For the purposes of this manual, "immediately" is defined as within 15 minutes.

Sample preservation is accomplished either by obtaining pre-preserved containers from an acceptable source or by adding preservatives in the field.

It is the responsibility of the field team accepting pre-preserved containers to make sure that the proper preservatives are used and desired results are achieved. The laboratory also supplies additional preservatives from the same source in suitable containers.

14.2 SAMPLE PRESERVATION

The following protocols apply for sample containers preserved in the field after the sample has been added:

1. Preservatives are at least reagent grade or higher. The acid for metals is suitable for trace metals analyses.
2. Fresh preservatives are obtained prior to each sampling event. Remaining preservatives that are not sealed must be discarded in an acceptable manner.
3. Preservatives are transported in pre-measured glass ampules and added directly to the sample.
4. A corresponding amount of preservative is added to the associated equipment blanks.
5. The pH is checked on all pH preserved samples with the exception of VOC, oil and grease, and TRPH.

Effectiveness of pH adjustment is made in the following manner:

1. Narrow range pH paper is used to test a small aliquot of the preserved sample.
2. A small portion of sample is placed into a container, checked with pH paper, and compared against the color chart.
3. Discard the aliquot properly, but do not pour back into the sample container.
4. If pH is acceptable, document in field log and prepare for transport to laboratory.

If pH is unacceptable, continue to add additional preservative in measured increments using the methods described above until an acceptable pH has been reached. Record the total amount of preservative used in the field log. Always use additional preservative from the same source as the initial preservation attempt.

In some cases, an extra dummy sample can be used to test pH preservation. Content should be suitably discarded.

If equipment blanks or field blanks are used, the maximum amount of preservative that was used to preserve any single sample in the set is added to the equipment or field blank.

Samples requiring temperature preservation are cooled to 4°C. The cooler will be checked to ensure that the ice has not melted.

14.3 SAMPLE CONTAINERS

ESC does not clean and re-use sample containers. ESC purchases all sample collection containers precleaned. All used sampling containers are discarded after use. The cleaning criteria of all containers must meet EPA analyte specific requirements.

QEC provides written certification that containers do not contain analytes of concern above method detection levels

ESC maintains records for these containers (lot numbers, certification statements, date of receipt, etc.) and intended uses are documented.

14.4 FIELD REAGENT HANDLING

Reagents, cleaning materials, and preservatives that are maintained by a field team will be stored, transported, and handled in such a way as to prevent and/or minimize contamination. The following storage and use protocols will be observed:

1. Chemicals are stored in-house and transported to the field segregated by reactivity.
2. Acids are stored in an acid storage cabinet and solvents are stored in a vented, explosion proof solvent storage cabinet.
3. All chemicals transported to the field are stored in bottles and packed to avoid breaks.

4. When reagents are transferred from an original container, the transport container must be pre-cleaned and of compatible material as the original container.
5. Chemicals are separated from sample containers and samples to avoid reaction and possible contamination.
6. Analyte free water is segregated from solvents to prevent contamination.

14.4.1 Reagent and Standard Storage

Chemical	Method of Storage
Nitric acid	Stored separated from other acids in original container in vented cabinet.
Sulfuric acid	See above
Hydrochloric acid	See above
Isopropanol	Stored in original glass container in vented and explosion proof solvent storage cabinet.
pH calibration buffers, turbidity standards, conductivity standards	Stored in cabinet designated for standard and reagent storage. Stored in temperature-controlled area of laboratory.
Sodium hydroxide	Stored in original container in designated cabinet in laboratory.
Sodium thiosulfate, zinc acetate, ascorbic acid, lead acetate	Stored in original containers in designated area of laboratory. Reagent solutions made fresh prior to use.

14.5 SAMPLE TRANSPORT

In the majority of situations, samples are delivered directly to the laboratory by the field sampling team or field courier following standard chain of custody protocols. Samples are preserved immediately (i.e., within 15 minutes) and packed with ice prior to transport. The field team relinquishes custody to the login sample custodian upon arrival at the laboratory.

Certain situations require that the field sampling team ship samples to the laboratory utilizing common carrier (UPS, FEDEX, etc.). If samples are sent by common carrier, all documentation (transmittal form, chain of custody, field data, analyses request, etc.) is placed in a ziplock bag and placed inside the sample container. The container is then sealed closed and sent to the laboratory in the required time frame to meet requirements of time-sensitive analyses.

14.6 BIOMONITORING SAMPLING

Preservation and Sample Volume

Aqueous samples collected for Bioassay can be collected in either glass or HDPE plastic. There is no required chemical preservation for this type of sample but the sample must be kept at 4 ± 2°C. The required volume varies independently with each type of analysis but the minimum collected is 250mL. The samples can be held for a maximum of 36 hours from the time of collection until first use.

Sample Collection

Grab sample protocols are utilized for acute bioassay unless otherwise specified in permit requirements. Composite sampling protocols are utilized for chronic bioassays unless otherwise specified in permit requirements. (Actual sampling protocols are discussed in detail throughout this appendix) ESC field collection personnel are required to collect all bioassay samples by completely filling the sample bottle and leaving no headspace. It is important that bottles be filled completely to reduce possible aeration that may reduce the toxic properties of the sample. If a customer chooses to collect the samples, a trained ESC field collection person can explain in detail the importance of reducing aeration by filling the sample bottle completely.

14.6.1 Biomonitoring Sampling Containers

All bioassay glassware are cleaned using the following EPA protocol:

- soak for 15 minutes in hot tap water with detergent and scrub
- rinse thoroughly with hot tap water
- rinse thoroughly with dilute nitric acid (10%)
- rinse thoroughly with deionized water
- rinse thoroughly with pesticide grade acetone

TABLE 14.6: PRESERVATION, HOLDING TIME AND SAMPLE CONTAINERS

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
AIR METHODS									
Volatiles in Ambient Air	Air	EPA TO-15	NA	Various	Canister	None	Ambient	14	Days
Volatiles in Ambient Air	Air	EPA TO-15	NA	Various	Tedlar	None	Ambient	5	Days
Volatiles in Ambient Air	Air	EPA Method 18	NA	Various	Canister	None	Ambient	14	Days
Volatiles in Ambient Air	Air	EPA Method 18	NA	Various	Tedlar	None	Ambient	5	Days
Ohio VAP EPA Method 8260B	Air	NA	EPA 8260B	Various	Canister	None	Ambient	14	Days
Ohio VAP EPA Method 8260B	Air	NA	EPA 8260B	Various	Tedlar	None	Ambient	5	Days
Methane, Ethane, Ethene, Propane	Air	RSK-175	NA	Various	Canister	None	Ambient	14	Days
Methane, Ethane, Ethene, Propane	Air	RSK-175	NA	Various	Tedlar	None	Ambient	5	Days
Fixed Gases - C_2, CO_2, CO, and CH_4	Air	ASTM D1946/D5314	NA	Various	Canister	None	Ambient	14	Days
Fixed Gases - C_2, CO_2, CO, and CH_4	Air	ASTM D1946/D5314	NA	Various	Tedlar	None	Ambient	5	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Arizona State Specific VOCs in Vapor - 8260B	Air	NA	EPA 8260B	Various	Canister	None	Ambient	30	Days
Arizona State Specific VOCs in Vapor - 8260B	Air	NA	EPA 8260B	Various	Tedlar	None	Ambient	72	Hours
Arizona State Specific VOCs in Vapor - 8015B	Air	NA	EPA 8015B	Various	Canister	None	Ambient	30	Days
Arizona State Specific VOCs in Vapor - 8015B	Air	NA	EPA 8015B	Various	Tedlar	None	Ambient	72	Hours
AQUATIC TOXICITY & RELATED									
C.dubia - Acute	NPW	2002	NA	1L/1Gal	HDPE	None	0 - 6°C	36	Hours
Minnow - Acute	NPW	2000	NA	1L/1Gal	HDPE	None	0 - 6°C	36	Hours
Toxicity C.dubia - Chronic	NPW	1002	NA	1L/1Gal	HDPE	None	0 - 6°C	36	Hours
Toxicity Minnow - Chronic	NPW	1000	NA	1L/1Gal	HDPE	None	0 - 6°C	36	Hours
BACTERIA									
Chlorophyll A/Pheophytin A	NPW	SM10200H	NA	1L	Amber Glass	None	0 - 6°C	72	Hours
Coliform, Total	NPW	SM9222B	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	8	Hours
E. Coli	NPW	SM9223B, Colilert	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	8	Hours
Enterococci	NPW	ASTM D6503-99, Enterolert	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	8	Hours
Fecal Coliform	NPW	SM9222D	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	6	Hours
Fecal Coliform	NPW	SM9221C/E	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	6	Hours
Heterotropic Plate Count	NPW	9215B	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	6	Hours
Salmonella	NPW	SM9260D	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	8	Hours
Cryptosporidium	PW	1622, 1623	NA	10L	LDPE	None	<20°C	96	Hours
E. Coli	PW	SM9223B	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	30	Hours
Fecal Coliform (MPN)	PW	9221E	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	30	Hours
Fecal Coliform	PW	SM9222D	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	30	Hours
Enterococci	PW	ASTM D6503-99	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	30	Hours
Heterotropic Plate Count	PW	9215B	NA	110ml	Micro	$Na_2S_2O_3$	0 - 6°C	6	Hours
Coliform, Total	PW	9222B, 9223B	NA	110ml	Plastic	$Na_2S_2O_3$	0 - 6°C	30	Hours
Coliform, Total	SS	SM9221B, 9222	NA	Sterile 125mL	Plastic	None	0 - 6°C	24	Hours
Fecal Coliform (MPN)	SS	9221E	NA	Sterile 125mL	Plastic	None	0 - 6°C	24	Hours
Fecal Coliform (Sludge)	SS	9222D	NA	Sterile 125mL	Plastic	None	0 - 6°C	24	Hours

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Enterococci	SS	ASTM D6503-99	9230	Sterile 125mL	Plastic	None	0 - 6°C	6	Hours
Salmonella	SS	SM9260D	NA	110ml	Micro	None	0 - 6°C	6	Hours
Heterotropic Plate Count	SS	SM9215B	NA	110ml	Micro	None	0 - 6°C	6	Hours
S.O.U.R.	SS	SM 2710B	NA	1L	HDPE	None	0 - 6°C	2	Hours
INORGANIC CLASSIC									
Acidity	NPW	SM2310B, ASTM D1067	NA	250ml	HDPE	None	0 - 6°C	14	Days
Alkalinity	NPW	SM2320B	NA	500ml	HDPE	None	0 - 6°C	14	Days
Alkalinity	NPW	310.2	NA	500ml	HDPE	None	0 - 6°C	14	Days
Ammonia Nitrogen	NPW	350.1, SM4500NH$_3$ G	NA	500ml	HDPE	H_2SO_4+$Na_2S_2O_3$	0 - 6°C	28	Days
Ammonia, distilled/titration (4500)	NPW	SM4500NH$_3$ C	NA	500ml	HDPE	H_2SO_4+$Na_2S_2O_4$	0 - 6°C	28	Days
Asbestos	NPW	100.1	NA	1L	Glass	None	0 - 6°C	48	Hours
BOD/CBOD (Total & Soluble)	NPW	SM5210B	NA	1L	HDPE	None	0 - 6°C	48	Hours
Bromide	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6°C	28	Days
Carbon Dioxide	NPW	SM4500CO2 D	NA	1L	HDPE	None	0 - 6°C	15	Min
Chemical Oxygen Demand (COD)	NPW	410.4, SM5220D	NA	250ml	HDPE	H_2SO_4	0 - 6°C	28	Days
Chemical Oxygen Demand (COD), Soluble	NPW	410.4, SM5220D	NA	250ml	HDPE	None	0 - 6°C	28	Days
Chloride	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6°C	28	Days
Chlorine, residual	NPW	SM4500Cl-G	NA	250ml	HDPE	None	0 - 6°C	15	Min
Color	NPW	SM2120B	NA	250ml	HDPE	None	0 - 6°C	48	Hours
CTAS Surfactants	NPW	SM5540D	NA	1L	HDPE	None	0 - 6°C	48	Hours
Cyanide - Total	NPW	335.4, SM4500CNE	9012	250ml	Amber HDPE	NaOH	0 - 6°C	14	Days
Cyanide - Total	NPW	Kelada-01	NA	250ml	Amber HDPE	NaOH	0 - 6°C	14	Days
Cyanide, Amenable	NPW	SM4500CNG	9012	250ml	Amber HDPE	NaOH	0 - 6°C	14	Days
Cyanide, Free	NPW	SM4500CNE	NA	250ml	Amber HDPE	NaOH	0 - 6°C	14	Days
Cyanide, Weak Acid Dissoc.	NPW	SM4500CN-I	NA	250ml	Amber HDPE	NaOH	0 - 6°C	14	Days
Dissolved Organic Carbon (DOC)	NPW	SM5310B	9060	250ml	Amber Glass	None	0 - 6°C	28	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Ferrous Iron	NPW	SM3500FeB	NA	250ml	Amber Glass	HCl	0 - 6°C	15	Min
Fluoride	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6°C	28	Days
Hardness	NPW	200.7, SM2340B	NA	250ml	HDPE	HNO_3	0 - 6°C	180	Days
Hardness	NPW	130.1	NA	500ml	HDPE	HNO_3	0 - 6°C	180	Days
Hardness	NPW	SM2340C	NA	500ml	HDPE	HNO_3	0 - 6°C	180	Days
Iodide	NPW	345.1	NA	250ml	HDPE	None	0 - 6°C	Immed	
Kjeldahl Nitrogen, TKN	NPW	351.2, SM4500Norg B/C	NA	250ml	HDPE	H_2SO_4	0 - 6°C	28	Days
Methylene Blue Active Subst. (MBAS)	NPW	SM5540C	NA	250ml	HDPE	None	0 - 6°C	48	Hours
Nitrate	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6°C	48	Hours
Nitrate + Nitrite	NPW	353.2, SM4500NO_3 F	NA	250ml	HDPE	H_2SO_4	0 - 6°C	28	Days
Nitrite	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6°C	48	Hours
Oil & Grease (Hexane Extr)	NPW	1664A, SM5520B	9070	1L	Glass	HCl	0 - 6°C	28	Days
Oil & Grease, Free	NPW	1664A	9070	1L	Amber Glass	None	0 - 6°C	28	Days
Organic Nitrogen	NPW	351.2 - 350.1	NA	500ml	HDPE	H_2SO_4	0 - 6°C	28	Days
Oxygen, dissolved (DO)	NPW	SM4500O C, SM4500O G	NA	125ml	HDPE	None	0 - 6°C	15	Min
pH	NPW	SM4500H B	9040	125ml	HDPE	None	0 - 6°C	15	Min
Phenols (Total) by 4AAP	NPW	420.1, 420.4	9066	250ml	Amber Glass	H_2SO_4	0 - 6°C	28	Days
Phosphate, Ortho	NPW	365.1, SM4500P-E	NA	250ml	HDPE	None	0 - 6°C	48	Hours
Phosphorus, Total	NPW	365.1, SM4500P-B.5	NA	250ml	HDPE	H_2SO_4	0 - 6°C	28	Days
Residue, Filterable (TDS)	NPW	SM2540C	NA	250ml	HDPE	None	0 - 6°C	7	days
Residue, non-Filterable (TSS)	NPW	SM2540D	NA	1L	HDPE	None	0 - 6°C	7	Days
Residue, Settleable (SS)	NPW	SM2540F	NA	1L	HDPE	None	0 - 6°C	48	Hours
Residue, Total (TS)	NPW	SM2540B	NA	250ml	HDPE	None	0 - 6°C	7	Days
Specific Conductance (Conductivity)	NPW	120.1, SM2510B	9050	250ml	HDPE	None	0 - 6°C	28	Days
Sulfate	NPW	300.0, SM4110B	9056	125ml	HDPE	None	0 - 6°C	28	Days
Sulfide	NPW	NA	9030, 9034	500ml	HDPE	NaOH+ZnAc	0 - 6°C	7	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Sulfide	NPW	SM4500S^{2}D	NA	500ml	HDPE	NaOH+ZnAc	0 - 6°C	7	Days
Sulfide, Dissolved	NPW	SM4500S^{2}D	NA	125ml	Amber Glass	NaOH+ZnAc	0 - 6°C	7	Days
Sulfite	NPW	SM4500SO$_3$ B	NA	250ml	HDPE	None	0 - 6°C	15	Min
Tannins and Lignins	NPW	SM5550B	NA	250ml	HDPE	None	0 - 6°C	NA	
Temperature	NPW	SM2550B	NA	onsite		None	0 - 6°C	15	Min
Total Organic Carbon (TOC)	NPW	SM53010B	9060	250ml	Amber Glass	HCl	0 - 6°C	28	Days
Total Organic Halides (TOX)	NPW	450.1, 9020	NA	1L	Amber Glass	H_2SO_4	0 - 6°C	28	Days
Total Organic Halides (TOX)	NPW	SM5320B	NA	1L	Amber Glass	H_2SO_4	0 - 6°C	14	Days
Turbidity	NPW	180.1, SM2130B	NA	250ml	HDPE	None	0 - 6°C	48	Hours
Volatile Solids (VS)	NPW	160.4	NA	250ml	HDPE	None	0 - 6°C	7	Days
Volatile Susp. Solids (VSS)	NPW	SM2540E	NA	500ml	HDPE	None	0 - 6°C	7	Days
Alkalinity	PW	2320B	NA	500ml	HDPE	None	0 - 6°C	14	Days
Ammonia Nitrogen	PW	350.1, SM4500NH$_3$ G	NA	250ml	HDPE	H_2SO_4	0 - 6°C	28	Days
Ammonia, distilled/titration (4500)	PW	SM4500NH$_3$ C	NA	250ml	HDPE	H_2SO_4	0 - 6°C	28	Days
Asbestos	PW	100.1	NA	1L	Glass	None	0 - 6°C	48	Hours
Bromide	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6°C	28	Days
Calcium-hardness	PW	SM3500-Ca B	NA	250ml	Amber Glass	HNO_3	0 - 6°C	180	Days
Carbon Dioxide	PW	SM4500CO2 D	NA	1L	HDPE	None	0 - 6°C	15	Min
Chloride	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6°C	28	Days
Chlorine, residual	PW	SM4500Cl-G	NA	250ml	HDPE	None	0 - 6°C	15	Min
Color	PW	SM2120B	NA	250ml	HDPE	None	0 - 6°C	48	Hours
Corrosivity	PW	Calc	NA		Plastic	None	0 - 6°C	NA	
Cyanide - Total	PW	335.4, SM4500CNE	NA	250ml	HDPE Amber	NaOH	0 - 6°C	14	Days
Cyanide - Total	PW	Kelada-01	NA	250ml	HDPE Amber	NaOH	0 - 6°C	14	Days
Cyanide, Amenable	PW	SM4500CNG	NA	250ml	HDPE Amber	NaOH	0 - 6°C	14	Days
Cyanide, Free	PW	SM4500CNE	NA	250ml	HDPE Amber	NaOH	0 - 6°C	14	Days
Dissolved Organic Carbon (DOC)	PW	SM5310C	NA	250ml	Amber Glass	None	0 - 6°C	28	Days
Dissolved Solids (TDS)	PW	SM2540C	NA	250ml	HDPE	None	0 - 6°C	7	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Fluoride	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6°C	28	Days
Hardness	PW	200.7, SM2340B	NA	250ml	HDPE	HNO_3	0 - 6°C	180	Days
Hardness	PW	130.1	NA	500ml	HDPE	HNO_3	0 - 6°C	180	Days
Hardness	PW	SM2340C	NA	500ml	HDPE	HNO_3	0 - 6°C	180	Days
Methylene Blue Active Subst. (MBAS)	PW	SM5540C	NA	1L	HDPE	None	0 - 6°C	48	Hours
Nitrate	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6°C	48	Hours
Nitrate + Nitrite	PW	353.2, SM4500NO_3 F	NA	250ml	HDPE	H_2SO_4	0 - 6°C	28	Days
Nitrite	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6°C	48	Hours
Odor	PW	SM2150B	NA	250ml	Amber Glass	None	0 - 6°C	24	Hours
Perchlorate	PW	314	NA	125ml	HDPE	None	0 - 6°C	28	Days
pH	PW	150.1, SM4500-H B	NA	125ml	HDPE	None	0 - 6°C	15	Min
Phosphate, Ortho	PW	SM4500P-E	NA	250ml	HDPE	None	0 - 6°C	48	Hours
Specific Conductance	PW	SM2510B	NA	250ml	HDPE	None	0 - 6°C	28	Days
Sulfate	PW	300.0, SM4110B	NA	125ml	HDPE	None	0 - 6°C	28	Days
Total Organic Carbon (TOC)	PW	SM5310C	NA	250ml	Amber Glass	H_2SO_4	0 - 6°C	28	Days
Total Organic Halides (TOX)	PW	SM5320B	NA	1L	Amber Glass	H_2SO_4	0 - 6°C	28	Days
Turbidity	PW	180.1, SM2130B	NA	250ml	HDPE	None	0 - 6°C	48	Hours
UV Absorbance at 254 nm	PW	SM5910B	NA	250ml	Amber Glass	None	0 - 6°C	48	Hours
Asbestos	SS	PLM	NA			None	0 - 6°C	NA	
Bromide	SS	NA	9056	4 oz.	Glass	None	0 - 6°C	28	Days
Chloride	SS	NA	9056	4 oz.	Glass	None	0 - 6°C	28	Days
Corrosivity	SS	NA	9045D	4 oz.	Glass	None	0 - 6°C	15	Min
Cyanide - Total	SS	NA	9010/9012	4 oz.	Glass	None	0 - 6°C	14	Days
Cyanide, Amenable	SS	NA	9010/9012	4 oz.	Glass	None	0 - 6°C	14	Days
Cyanide, Free	SS	NA	9010/9012	4 oz.	Glass	None	0 - 6°C	14	Days
Extractable Organic Halides (EOX)	SS	NA	9023	4 oz.	Glass	None	0 - 6°C	28	Days
Fluoride	SS	NA	9056	4 oz.	Glass	None	0 - 6°C	28	Days
Kjeldahl Nitrogen, TKN	SS	351.2	NA	2 oz.	Glass	None	0 - 6°C	28	Days
Nitrate	SS	NA	9056	4 oz.	Glass	None	0 - 6°C	28	Days
Nitrite	SS	NA	9056	4 oz.	Glass	None	0 - 6°C	28	Days
Oil & Grease	SS	NA	9071	4 oz.	Glass	None	0 - 6°C	28	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
pH	SS	NA	9040, 9045	2 oz.	Glass	None	0 - 6°C	15	Min
Phenols by 4AAP	SS	NA	9066	4 oz.	Glass	None	0 - 6°C	28	Days
Phosphate, Ortho	SS	SM4500P-E	NA	4 oz.	Glass	None	0 - 6°C	48	Hours
Phosphorus, Total	SS	NA	9056	4 oz.	Glass	None	0 - 6°C	28	Days
Residue, Total	SS	SM2540G	NA	4 oz.	Glass	None	0 - 6°C	14	Days
Solids, Total	SS	SM2540B	NA	4 oz.	Glass	None	0 - 6°C	14	Days
Specific Conductance	SS	NA	9050	4 oz.	Glass	None	0 - 6°C	28	Days
Sulfate	SS	NA	9056	4 oz.	Glass	None	0 - 6°C	28	Days
Sulfide	SS	NA	9030, 9034	2 oz.	Glass	none	0 - 6°C	7	Days
Total Organic Carbon (TOC)	SS	NA	9060	2 oz.	Glass	None	0 - 6°C	28	Days
Total Organic Carbon (TOC)	SS	ASTM F1647-02A mod	NA	4 oz.	Glass	None	0 - 6°C	28	Days
Total Organic Carbon (TOC)	SS	USDA LOI	NA	4 oz.	Glass	None	0 - 6°C	28	Days
INORGANIC METALS									
Chromium, Hexavalent - Cr^{+6}	NPW	SM3500CrB	7196	250ml	HDPE	None	0 - 6°C	24	Hours
Chromium, Hexavalent - Cr^{+6}	NPW	SM3500CrC	7199	250ml	HDPE	None	0 - 6°C	24	Hours
Chromium, Hexavalent - Cr^{+6}	NPW	218.6, SM3500CrC	NA	125ml	HDPE	$(NH_4)_2SO_4$	0 - 6°C	28 [5]	Days
Mercury (Dissolved)	NPW	245.1	7470	500ml	HDPE	None	0 - 6°C	28	Days
Mercury (Total)	NPW	245.1	7470	500ml	HDPE	HNO_3	0 - 6°C	28	Days
Metals (Dissolved) ICP	NPW	200.7	6010	500ml	HDPE	None	NA	180	Days
Metals (Dissolved) ICPMS	NPW	200.8	6020	500nl	HDPE	None	NA	180	Days
Metals (Total) ICP	NPW	200.7	6010	500ml	HDPE	HNO_3	NA	180	Days
Metals (Total) ICPMS	NPW	200.8	6020	500ml	HDPE	HNO_3	NA	180	Days
Chromium, Hexavalent - Cr^{+6}	PW	218.7	NA	125ml	HDPE	$(NH_4)_2SO_4$/(NH4)OH	0 - 6°C	14	Days
Mercury (Dissolved)	PW	245.1	NA	500ml	HDPE	None	0 - 6°C	28	Days
Mercury (Total)	PW	245.1	NA	500ml	HDPE	HNO_3	0 - 6°C	28	Days
Metals (Dissolved) ICP	PW	200.7	NA	500ml	HDPE	None	NA	180	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Metals (Dissolved) ICPMS	PW	200.8	NA	500ml	HDPE	None	NA	180	Days
Metals (Total) ICP	PW	200.7	NA	500ml	HDPE	HNO_3	NA	180	Days
Metals (Total) ICPMS	PW	200.8	NA	500ml	HDPE	HNO_3	NA	180	Days
Chromium, Hexavalent - Cr^{+6}	SS	NA	3060/7196	4 oz.	Glass	None	0 - 6°C	30	Days
Chromium, Hexavalent - Cr^{+6}	SS	NA	3060/7199	4 oz.	Glass	None	0 - 6°C	30	Days
Mercury (Total)	SS	NA	7471	2 oz.	Glass	<6 C	0 - 6°C	28	Days
Metals (Total) ICP	SS	NA	6010	2 oz.	Glass	None	NA	180	Days
Metals (Total) ICPMS	SS	NA	6020	4 oz.	Glass	None	NA	180	Days
Sodium Adsorption Ratio (SAR)	SS	NA	6010	250mL	Glass	None	0 - 6°C	180	Days
Michigan Fine/Coarse Soil Sieve for Lead	SS	NA	NA	250mL	Glass	None	0 - 6°C	180	Days
PHYSICAL									
Flashpoint/ignitability (Closed Cup)	NPW	ASTM 93-07	1010	1L	Glass	None	0 - 6°C	14	Days
Flashpoint/ignitability (Open Cup)	NPW	ASTM 92-05A	NA	1L	Glass	None	0 - 6°C	14	Days
Flashpoint/ignitability (Closed Cup)	SS	ASTM 93-07	1010	4 oz.	Glass	None	0 - 6°C	14	Days
Flashpoint/ignitability (Open Cup)	SS	ASTM 92-05A	NA	4 oz.	Glass	None	0 - 6°C	NA	
Ash Content	SS	SM2540G, ASTM D2974	NA	4 oz.	Glass	None	0 - 6°C	14	Days
Cation Exchange Capacity	SS	NA	9081	4 oz.	Glass	None	0 - 6°C	180	Days
Paint Filter Test	SS	NA	9095	4 oz.	Glass	None	0 - 6°C	NA	
Permeability (Section 2.8)	SS	NA	9100	Various	Shelby Tube	None	0 - 6°C	28	Days
React. Sulf.(SW846 7.3.4.2)	SS	NA	Sec. 7.3	4 oz.	Glass	None	0 - 6°C	7	Days
Reactive CN (SW846 7.3.4.1)	SS	NA	Sec. 7.3	4 oz.	Glass	None	0 - 6°C	14	Days
Resistivity (ASTM)	SS	NA	NA	16 oz	Glass	None	0 - 6°C	28	Days
Specific Gravity	SS	NA	NA	Various	Plastic	None	0 - 6°C	14	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
LEACHING METHODS									
Cal Wet (CACR Title22 Chap11 AppII)	SS	NA	NA	100g	Glass	None	0 - 6°C	14/28/180	Days
EP TOX	SS	NA	1310	100g	Glass	None	0 - 6°C	14/28/180	Days
MEP	SS	NA	1320	100g	Glass	None	0 - 6°C	14/28/180	Days
SPLP	SS	NA	1312	100g	Glass	None	0 - 6°C	14/28/180	Days
TCLP	SS	NA	1311	100g	Glass	None	0 - 6°C	14/28/180	Days
ORGANIC - SEMIVOLATILES									
Base/Neutral/Acid (BNA)	NPW	NA	8270	1L or 100mL	Amber Glass	None	0 - 6°C	7	Days
Base/Neutral/Acid (BNA)	NPW	625, SM6410B	NA	1L or 100mL	Amber Glass	$Na_2S_2O_3$	0 - 6°C	7	Days
Diesel Range Organics	NPW	NA	8015	1L, 100mL, or 40mL	Amber Glass	HCl	0 - 6°C	7	Days
Dioxin	NPW	1613	NA	1L	Amber Glass	$Na_2S_2O_3$	0 - 6°C	1	Year
EDB/DBCP	NPW	NA	8011	2 x 40 ml	Glass	$Na_2S_2O_3$	0 - 6°C	7	Days
Formaldehyde	NPW	NA	8315	1L	Amber Glass	None	0 - 6°C	3	Days
Herbicides	NPW	1658, SM6640B	8151	1L	Amber Glass	None	0 - 6°C	7	Days
Polynuclear Aromatic Hydrocarbons (PAH)	NPW	625, SM640B	8270	1L, 100mL, or 40mL	Amber Glass	None	0 - 6°C	7	Days
Polynuclear Aromatic Hydrocarbons (PAH-SIM)	NPW	NA	8270	1L, 100mL, or 40mL	Amber Glass	None	0 - 6°C	7	Days
Polynuclear Aromatic Hydrocarbons (PAH)	NPW	610, SM6440B	8310	1L	Amber Glass	None	0 - 6°C	7	Days
Pesticides - Organophos Comp	NPW	614, 622, 1657	8141	1L	Amber Glass	None	0 - 6°C	7	Days
Pesticides & PCB's	NPW	608, SM6630B, SM6630C	8081, 8082	1L or 100mL	Amber Glass	None	0 - 6°C	7	Days
Base/Neutral/Acid (BNA)	PW	525	NA	1L	Amber Glass	$HCl+Na_2S_2O_3$	0 - 6°C	7	Days
Carbamates	PW	531.1	NA	2 x 60ml	Amber Glass	$AcAcid+Na_2S_2O_3$	0 - 6°C	7	Days
Dioxin	PW	1613	NA	1L	Amber Glass	$Na_2S_2O_3$	0 - 6°C	7	Days
Diquat	PW	549	NA	1L	PVC Amber	$H_2SO_4 + Na_2S_2O_3$	0 - 6°C	7	Days
EDB/DBCP	PW	504.1	NA	2 x 40 ml	Glass	$Na_2S_2O_3$	0 - 6°C	28	Days
Endothall	PW	548	NA	250ml	Amber Glass	$Na_2S_2O_3$	0 - 6°C	7	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Glyphosate	PW	547	NA	2 x 60ml	Glass	$Na_2S_2O_3$	0 - 6°C	7	Days
Herbicides	PW	515.1, SM6640B	NA	1L	Amber Glass	$Na_2S_2O_3$	0 - 6°C	7	Days
Pesticides - Nitrogen/phosphorus Comp	PW	507	NA	1L	Amber Glass	$Na_2S_2O_3$	0 - 6°C	14	Days
Pesticides - Organochlorine	PW	508	NA	1L	Amber Glass	$Na_2S_2O_3$	0 - 6°C	7	Days
Haloacetic acids - HAA's	PW	552.2	NA	500ml	Amber Glass	NH_4Cl	0 - 6°C	28	Days
Base/Neutral/Acid (BNA)	SS	NA	8270	4 oz.	Glass	None	0 - 6°C	14	Days
Dioxin	SS	NA	8290	5 oz.	Glass	None	0 - 6°C	30	Days
Formaldehyde	SS	NA	8315	4 oz.	Glass	None	0 - 6°C	3	Days
Herbicides	SS	NA	8151	4 oz.	Glass	None	0 - 6°C	14	Days
Polynuclear Aromatic Hydrocarbons (PAH)	SS	NA	8270	4 oz.	Glass	None	0 - 6°C	14	Days
Polynuclear Aromatic Hydrocarbons (PAH-SIM)	SS	NA	8270	4 oz.	Glass	None	0 - 6°C	14	Days
Polynuclear Aromatic Hydrocarbons (PAH)	SS	NA	8310	4 oz.	Glass	None	0 - 6°C	14	Days
Pesticides - Organophos Comp	SS	NA	8141	4 oz.	Glass	None	0 - 6°C	14	Days
Pesticides & PCB's	SS	NA	8081, 8082	4 oz.	Glass	None	0 - 6°C	14	Days
Total Chlorine in Oil	SS	ASTM D808-00	NA	125ml	HDPE	None	0 - 6°C	24	Hours
ORGANIC - VOLATILES									
Meetac - Methanol and Ethanol	NPW	NA	EPA 8015 Mod	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Methane, Ethane, Ethene, Propane	NPW	RSK-175	NA	40ml	Amber Glass	HCl	0 - 6°C	14	Days
BTEX (water)	NPW	602, SM6200C	8021	2 x 40 ml	Amber Glass	HCl	0 - 6°C	14	Days
BTEX (water)	NPW	602, SM6200C	8021	2 x 40 ml	Amber Glass	None	0 - 6°C	7	Days
Gasoline Range Organics (GRO)	NPW	NA	8015	2 x 40 ml	Amber Glass	HCl	0 - 6°C	14	Days
VOC's	NPW	624, SM6200B	8260	2 x 40 ml	Amber Glass	HCl	0 - 6°C	14	Days
VOC's	NPW	624, SM6200B	8260	2 x 40 ml	Amber Glass	none	0 - 6°C	7	Days
VOC's	PW	524.2	NA	2 x 40 ml	Amber Glass	Ascorbic Acid+HCl	0 - 6°C	14	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Meetac - Methanol and Ethanol	SS	NA	EPA 8015 Mod	2 oz.	Glass	None	0 - 6°C	14	Days
BTEX (soil)	SS	NA	8021	4 oz.	Glass	None	0 - 6°C	14	Days
VOC's	SS	NA	8260	2 oz.	Glass	none	0 - 6°C	14	Days
VOC's	SS	NA	8260	40ml	Amber Glass	MeOH	0 - 6°C	14	Days
VOC's	SS	NA	8260	40ml	Amber Glass	$NaHSO_4$ or TSP(MO) or DI Water(FL)	0 - 6°C	14	Days
VOC's	SS	NA	8260	NA	Encore	none	0 - 6°C	48	Hours
RADIOCHEMISTRY									
Rad - Gross alpha	NPW	900	na	1L	Plastic	HNO_3	0 - 6°C	180	Days
Rad - Gross beta	NPW	900	na	1L	Plastic	HNO_3	0 - 6°C	180	Days
Rad - Radium 226	NPW	903.1	na	1L	Plastic	HNO_3	0 - 6°C	180	Days
Rad - Radium 228	NPW	904	na	1L	Plastic	HNO_3	0 - 6°C	180	Days
Rad - Gross alpha	PW	900	na	1L	HDPE	HNO_3	0 - 6°C	180	Days
Rad - Gross beta	PW	900	na	1L	HDPE	HNO_3	0 - 6°C	180	Days
Rad - Radium 226	PW	903.1	na	1L	HDPE	HNO_3	0 - 6°C	180	Days
Rad - Radium 228	PW	904	na	1L	HDPE	HNO_3	0 - 6°C	180	Days
Rad - Tritium	PW	906	na	1L	HDPE	None	0 - 6°C	180	Days
Strontium-90	PW	905	na	1L	HDPE	HNO_3	0 - 6°C	180	Days
STATE SPECIFIC PETROLEUM METHODS									
Alaska DRO	NPW	NA	AK102	100ml	Amber Glass	HCl	0 - 6°C	14	Days
Alaska DRO	SS	NA	AK102	4 oz.	Glass	None	0 - 6°C	14	Days
Alaska GRO	NPW	NA	AK101	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Alaska GRO	SS	NA	AK101	60ml	Amber Glass	MeOH	0 - 6°C	28	Days
Alaska Motor Oil	NPW	NA	AK103	100ml	Glass	HCl	0 - 6°C	14	Days
Alaska Motor Oil	SS	NA	AK103	4 oz.	Glass	None	0 - 6°C	14	Days
Arizona GRO	SS	NA	AZ 8015	2 oz.	Glass	None	0 - 6°C	14 [9]	Days
Arizona TPH	SS	NA	AZ 8015	4 oz.	Glass	None	0 - 6°C	14	Days
California DRO	NPW	NA	8015	1L	Amber Glass	HCl	0 - 6°C	7	Days
California DRO	NPW	NA	8015	40ml	Amber Glass	HCl	0 - 6°C	7	Days
California DRO	SS	NA	8015	4 oz.	Glass	None	0 - 6°C	7	Days
Connecticut EPH	NPW	NA	8015	1L	Amber Glass	HCl	0 - 6°C	14	Days
Connecticut EPH	SS	NA	8015	4 oz.	Glass	None	0 - 6°C	14	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Florida TPH	NPW	NA	FL-Pro	1L	Amber Glass	HCl	0 - 6°C	7	Days
Florida TPH	SS	NA	FL-Pro	4 oz.	Glass	None	0 - 6°C	14	Days
Indiana DRO	NPW	NA	8015	1L	Amber Glass	HCl	0 - 6°C	7	Days
Indiana DRO	SS	NA	8015	4 oz.	Glass	None	0 - 6°C	14	Days
Indiana ERO	NPW	NA	8015	1L	Amber Glass	HCl	0 - 6°C	7	Days
Indiana ERO	SS	NA	8015	4 oz.	Glass	None	0 - 6°C	7	Days
Indiana GRO	NPW	NA	8015	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Indiana GRO	SS	NA	8015	40ml	Amber Glass	MeOH	0 - 6°C	14	Days
Indiana GRO	SS	NA	8015	40ml	Amber Glass	$NaHSO_4$	0 - 6°C	14	Days
Iowa GRO	NPW	NA	OA-1	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Iowa GRO	SS	NA	OA-1	4 oz.	Glass	None	0 - 6°C	14	Days
Iowa DRO	NPW	NA	OA-2	1L	Amber Glass	None	0 - 6°C	7	Days
Iowa DRO	SS	NA	OA-2	4 oz.	Glass	None	0 - 6°C	14	Days
Louisiana EPH	NPW	NA	MADEP EPH	1L	Amber Glass	HCl	0 - 6°C	14	Days
Louisiana EPH	SS	NA	MADEP EPH	4 oz.	Amber Glass	None	0 - 6°C	14	Days
Louisiana VPH	NPW	NA	MADEP VPH	1L	Amber Glass	HCl	0 - 6°C	14	Days
Louisiana VPH	SS	NA	MADEP VPH	40ml	Amber Glass	MeOH	0 - 6°C	28	Days
Massachusetts EPH	NPW	NA	MADEP EPH	1L	Amber Glass	HCl	0 - 6°C	14	Days
Massachusetts EPH	SS	NA	MADEP EPH	4 oz.	Amber Glass	None	0 - 6°C	14	Days
Massachusetts VPH	NPW	NA	MADEP VPH	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Massachusetts VPH	SS	NA	MADEP VPH	40ml	Amber Glass	MeOH	0 - 6°C	28	Days
Minnesota DRO	NPW	NA	WI DRO	1L	Amber Glass	HCl	0 - 6°C	7	Days
Minnesota DRO	SS	NA	WI DRO	60ml	Amber Glass	CH_3Cl	0 - 6°C	47 [9]	Days
Minnesota GRO	NPW	NA	WI GRO	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Minnesota GRO	SS	NA	WI GRO	60ml	Amber Glass	MeOH	0 - 6°C	21 [7]	Days
Missouri DRO	NPW	NA	8270	1L	Amber Glass	None	0 - 6°C	7	Days
Missouri DRO	SS	NA	8270	4 oz.	Glass	None	0 - 6°C	14	Days
Missouri GRO	NPW	NA	8260	40ml	Amber Glass	TSP	0 - 6°C	14	Days
Missouri GRO	SS	NA	8260	40ml	Amber Glass	TSP	0 - 6°C	14	Days
Missouri GRO	SS	NA	8260	40ml	Amber Glass	MeOH	0 - 6°C	14	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Montana EPH	NPW	NA	MT EPH	1L	Amber Glass	HCl	0 - 6°C	14	Days
Montana EPH	SS	NA	MT EPH	4 oz.	Amber Glass	None	0 - 6°C	14	Days
Montana VPH	NPW	NA	MT VPH	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Montana VPH	SS	NA	MT VPH	Encore	Amber Glass	None	0 - 6°C	7	Days
Montana VPH	SS	NA	MT VPH	40ml	Amber Glass	MeOH	0 - 6°C	28	Days
New Jersey EPH	NPW	NA	NJ EPH	1L	Amber Glass	HCl	0 - 6°C	14	Days
New Jersey EPH	SS	NA	NJ EPH	4 oz.	Amber Glass	None	0 - 6°C	14	Days
North Carolina EPH	NPW	NA	MADEP EPH	1L	Amber Glass	HCl	0 - 6°C	14	Days
North Carolina EPH	SS	NA	MADEP EPH	4 oz.	Amber Glass	None	0 - 6°C	14	Days
North Carolina VPH	NPW	NA	MADEP VPH	1L	Amber Glass	HCl	0 - 6°C	14	Days
North Carolina VPH	SS	NA	MADEP VPH	40ml	Amber Glass	MeOH	0 - 6°C	28	Days
Ohio DRO	NPW	NA	8015	1L	Amber Glass	None	0 - 6°C	7	Days
Ohio DRO	NPW	NA	8015	100ml	Amber Glass	None	0 - 6°C	7	Days
Ohio DRO	NPW	NA	8015	40ml	Amber Glass	None	0 - 6°C	7	Days
Ohio DRO	SS	NA	8015	4 oz.	Glass	None	0 - 6°C	14	Days
Ohio GRO	NPW	NA	8015	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Ohio GRO	SS	NA	8015	2 oz.	Glass	None	0 - 6°C	14	Days
Ohio GRO (VAP)	SS	NA	8015	Encore - Low Level	None	None	0 - 6°C	14 [8]	Days
Ohio GRO (VAP)	SS	NA	8015	Encore - High Level	None	MeOH	0 - 6°C	14	Days
Oklahoma DEQ GRO	NPW	NA	OK DEQ GRO	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Oklahoma DEQ GRO	SS	NA	OK DEQ GRO	4 oz.	Glass	None	0 - 6°C	14	Days
Oklahoma DEQ DRO	NPW	NA	OK DEQ DRO	1L	Amber Glass	HCl	0 - 6°C	7	Days
Oklahoma DEQ DRO	SS	NA	OK DEQ DRO	60ml	Amber Glass	CH_3Cl	0 - 6°C	7 [6]	Days
Oregon TPH-Gx	NPW	NA	NWTPH-Gx	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Oregon TPH-Gx	SS	NA	NWTPH-Gx	4 oz.	Glass	None	0 - 6°C	14	Days
Oregon TPH-Dx	NPW	NA	NWTPH-Dx	1L	Amber Glass	HCl	0 - 6°C	14	Days
Oregon TPH-Dx	SS	NA	NWTPH-Dx	4 oz.	Glass	None	0 - 6°C	14	Days

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Tenneessee DRO	NPW	NA	TN EPH	1L	Amber Glass	HCl	0 - 6°C	7	Days
Tenneessee DRO	NPW	NA	TN EPH	100 ml	Amber Glass	HCl	0 - 6°C	7	Days
Tenneessee DRO	SS	NA	TN EPH	4 oz.	Glass	None	0 - 6°C	14	Days
Tenneessee GRO	NPW	NA	TN GRO	40ml	Amber Glass	HCl	0 - 6°C	7	Days
Tenneessee GRO	SS	NA	TN GRO	2 oz.	Glass	None	0 - 6°C	14	Days
Texas TPH	NPW	NA	TX1005/ TX1006	60ml	Amber Glass	HCl	0 - 6°C	14	Days
Texas TPH	SS	NA	TX1005/ TX1006	4 oz.	Glass	None	0 - 6°C	14	Days
Washington TPH-Gx	NPW	NA	NWTPH-Gx	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Washington TPH-Gx	SS	NA	NWTPH-Gx	4 oz.	Glass	None	0 - 6°C	14	Days
Washington TPH-Dx	NPW	NA	NWTPH-Dx	1L	Amber Glass	HCl	0 - 6°C	14	Days
Washington TPH-Dx	SS	NA	NWTPH-Dx	4 oz.	Glass	None	0 - 6°C	14	Days
Wisconsin DRO	NPW	NA	WI DRO	1L	Amber Glass	HCl	0 - 6°C	7	Days
Wisconsin DRO	NPW	NA	WI DRO	100 ml	Amber Glass	HCl	0 - 6°C	7	Days
Wisconsin DRO	SS	NA	WI DRO	60ml	Amber Glass	CH_3Cl	0 - 6°C	47 [9]	Days
Wisconsin GRO	NPW	NA	WI GRO	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Wisconsin GRO	SS	NA	WI GRO	60ml	Amber Glass	MeOH	0 - 6°C	21 [7]	Days
Wyoming DRO	NPW	NA	8015	40ml	Amber Glass	HCl	0 - 6°C	7	Days
Wyoming DRO	NPW	NA	8015	1L	Amber Glass	HCl	0 - 6°C	7	Days
Wyoming DRO	SS	NA	8015	4 oz.	Glass	None	0 - 6°C	14	Days
Wyoming GRO	NPW	NA	8015	40ml	Amber Glass	HCl	0 - 6°C	14	Days
Wyoming GRO	SS	NA	8015	2 oz.	Glass	None	0 - 6°C	14	Days
INDUSTRIAL HYGIENE (IH) METHODS									
Particulates not otherwise regulated	Air	NIOSH 0500	NA	NA	2 piece 37mm PVC Pre-weighed filter	None	NA	NA	NA
Respirable Dust	Air	NIOSH 0600	NA	NA	3 piece 37mm PVC Pre-weighed filter	None	NA	NA	NA
Metals	Air	NA	EPA 6010B	NA	0.8-µm MCE or 5.0-µm PVC cassette	None	NA	NA	NA

Parameter	Matrix [1]	EPA Approved Method[2]	SW846 [3]	Rec. Volume	Bottle Type	Pres.	Temp	Holding Time	Holding Time Units
Metals	Air	NIOSH 7300	NA	NA	0.8-µm MCE or 5.0-µm PVC cassette	None	NA	NA	NA
Metals	Air	OSHA ID-125G	NA	NA	0.8-µm MCE or 5.0-µm PVC cassette	None	NA	NA	NA

Footnotes:

1) Matrix - NPW=Nonpotable Water, PW= Potable Water, SS=Solids

2) EPA Approved Method - Where applicable EPA methods are listed. Compounds/programs not regulated by EPA will have methods appropriate to their regulatory oversight.

3) SW846 Method - Where one exists, the appropriate Solid Waste method will be listed

4) Preservative Key

$(NH_4)_2SO4$ = Ammonium Sulfate

AcAcid = Acetic Acid

CH_3Cl = Methylene Chloride

H_2SO_4 = Sulfuric Acid

HCl= Hydrochloric Acid

HNO_3 = Nitric Acid

MeOH = Methanol

$Na_2S_2O_3$ = Sodium Thiosulfate

$NaHSO_4$ = Sodium Bisulfate

NH_4Cl = Ammonium Chloride

TSP = Trisodium Phosphate

ZnAc = Zinc Acetate

5) Must be field filtered to achieve the extended holding time.

6) Must be received by lab within 7 days of sampling for solvent addition.

7) Must be received by lab within 4 days of sampling for solvent addition.

8) Must be received by lab within 48 hours of sampling for freezing.

9) Must be received by lab within 72 hours of sampling for solvent addition.

14.7 SAMPLE CONTAINER PACKING PROCEDURES

ESC routinely sends sample containers to customers. Standard operating procedure determines the containers needed for the requested analyses. A sample request form is completed to document what is needed, the destination, the date prepared and the initials of the preparer. Containers are prepared, with appropriate preservatives, labels, and custody seals, and organized for the customer's convenience in a cooler. The cooler also contains a temperature blank, chain of custody, a return address label, and applicable instructions. The cooler is bound with packaging tape (and a custody seal if requested) and shipped UPS.

15.0 SAMPLE DISPATCH

Samples collected during field investigations or in response to a hazardous materials incident are classified by the project manager, prior to shipping, as either environmental or hazardous material samples. The shipment of samples, designated as environmental samples, is not regulated by the U.S. Department of Transportation.

Samples collected from certain process streams, drums, bulk storage tanks, soil, sediment, or water samples from suspected areas of high contamination may need to be shipped as hazardous. These regulations are promulgated by the US-DOT and described in the Code of Federal Regulations (49 CFR 171 through 177). The guidance for complying with US-DOT regulations in shipping environmental laboratory samples is given in the "National Guidance Package for Compliance with Department of Transportation Regulations in the Shipment of Environmental Laboratory Samples."

15.1 SHIPMENT OF ENVIRONMENTAL SAMPLES

Shipping receipts are maintained at the ESC laboratory. The shipment of preserved sample containers or bottles of preservatives (i.e., NaOH pellets, HCl, etc.) which are designated as hazardous under the US-DOT, Hazardous Materials Table, 49 CFR 171.101, must be transported pursuant to the appropriate US-DOT regulations. Samples packaged for shipment by ESC shall be segregated by sample type, preservation requirements, and potential contaminant level. During events in which large numbers of samples are collected, samples are segregated by analyses required. If multiple sites are sampled, or if specific and separate areas of interest are identified, samples are further segregated for packaging prior to shipment.

Environmental samples are packed prior to shipment using the following procedures:

1. Select a cooler (clean and strong). Line the cooler with a large heavy-duty plastic bag.
2 Allow sufficient headspace (except VOC's or others with zero headspace requirements) to compensate for any pressure and temperature changes.
3. Be sure the lids on all bottles are tight.
4. Place all bottles in appropriately sized polyethylene bags.
5. Place VOC vials in foam material transport sleeves.
6. Place foam padding in the bottom of the cooler and then place the bottles in the cooler with sufficient space to allow for the addition of more foam between the bottles.
7. Put ice on top of and/or between the samples.
8. Place chain of custody in a clean dry bag and into the cooler. Close the cooler and securely tape the cooler shut. The chain of custody seals should be affixed to the top and sides of the cooler so that the cooler cannot be opened without breaking the seal.

9. The shipping containers must be marked "THIS END UP". The name and address of the shipper shall be placed on the outside of the container. Labels used in the shipment of hazardous materials are not permitted to be on the outside of the container used to transport environmental samples and shall not be used.

16.0 INVESTIGATION WASTE

16.1 GENERAL

Field surveys conducted by ESC may generate waste materials. Some of these waste materials may be hazardous requiring proper disposal in accordance with EPA regulations.

16.1.1 Types of Investigation Derived Wastes (IDW)

Materials which may be included in the IDW category are:

- Personnel protective equipment (PPE)
- Disposable sampling equipment (DE)
- Soil cuttings
- Groundwater obtained through well purging
- Spent cleaning and decontamination fluids
- Spent calibration standards

16.1.2 Managing Non-hazardous IDW

Disposal of non-hazardous IDW should be addressed prior to initiating work at a site. Facility personnel should be consulted and wastes handled in an appropriate manner as directed by the customer.

For development and purge water generated in the State of Florida, specific disposal requirements apply. The water is contained on-site in temporary storage until it is characterized. Appropriate disposal and/or treatment methods are then determined. Possible disposal options are:

- Direct discharge on-site to infiltrate the same or a more contaminated source
- Transportation to an off-site facility

In no case shall the water be discharged into any surface water unless permitted.

16.1.3 Management of Hazardous IDW

Disposal of hazardous or suspected hazardous IDW (as defined in 40 CFR 261.30-261.33 or displaying the characteristics of ignitability, corrosivity, reactivity, or TC toxicity) must be specified in the sampling plan. Hazardous IDW must be disposed in compliance with USEPA regulations. If appropriate, these wastes may be taken to a facility waste treatment system. These wastes may also be disposed of in the source area from which they originated if state regulations permit.

If on-site disposal is not feasible, appropriate analyses must be conducted to determine if the waste is hazardous. If so, they must be properly contained and labeled. They may be stored on the site for a maximum of 90 days before they must be manifested and shipped to a permitted treatment or disposal facility. Weak acids and bases may be neutralized in lieu of disposal as hazardous wastes. Neutralized wastewaters may be flushed into a sanitary sewer.

If possible, arrangements for proper containment, labeling, transportation, and disposal/treatment of IDW should be anticipated beforehand.

Investigation derived wastes should be kept to a minimum. Most of the routine studies conducted by ESC should not produce any IDW that are hazardous. Many of the above PPE and DE wastes can be deposited in municipal dumpsters if care is taken to keep them segregated from hazardous waste contaminated materials. Disposable equipment can often be cleaned to render it nonhazardous, as can some PPE, such as splash suits. The volume of spent solvent waste produced during equipment decontamination can be reduced or eliminated by applying only the minimum amount of solvent necessary.

17.0 SAMPLING BIBLIOGRAPHY

17.1 *Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual,* February 1, 1991, US EPA Region IV, Environmental Services Division.

17.2 *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document* (GPO #5500000260-6), US EPA, September 1986.

17.3 *Test Methods for Evaluating Solid Waste*, SW-846, Third Edition, Office of Solid and Emergency Response, US EPA, November 1986.

17.4 *Methods for the Determination of Organic Compounds in Drinking Water*, EPA/600/4-88/039, December 1988.

17.5 Florida Department of Environmental Regulation (DER) Quality Assurance Section (QAS) Guidance Documents:
#89-01 - Equipment Material Construction, revised April 7, 1989
#89-02 - Field QC Blanks, revised April 28, 1989
#89-03 - Teflon® /Stainless Steel Bladder Pumps, revised May 10, 1988
#89-04 - Field Cleaning Procedures, revised August 10, 1989

17.6 *DER Manual for Preparing Quality Assurance Plans*, DER-QA-001/90, revised September 30, 1992.

17.7 *NPDES Compliance Inspection Manual*, United States Environmental Protection Agency, Enforcement Division, Office of Water Enforcement and Permits, EN-338, 1988.

17.8 *Handbook for Monitoring Industrial Wastewater*, United States Environmental Protection Agency, Technology Transfer, 1973.

17.9 *EPA Primary Drinking Water Regulations*, 40 CFR 141.

17.10 *Rapid Bioassessment Protocols For Use in Streams and Rivers*, United States Environmental Protection Agency, Office of Water, EPA/841/B-99-002.

17.11 *Environmental Sampling and Analysis: A Practical Guide*. Lawrence H. Keith, Ph.D., 1991. Lewis Publishers.

17.12 *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*. Fifth Edition. U.S. Environmental Protection Agency, Office of Water, Washington DC. EPA/821/R-02/012

17.13 *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*. Fourth Edition. U.S. Environmental Protection Agency, Office of Water, Washington DC. EPA/821/R-02/013.

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18.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix III)	General - Replaced the term “client with the term “customer

1.0 SIGNATORY APPROVALS

WET LAB QUALITY ASSURANCE MANUAL

APPENDIX IV TO THE ESC QUALITY ASSURANCE MANUAL

for

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Prepared by

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NOTE: The QAM has been approved by the following people.

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This manual discusses specific QA requirements for general analytical protocols to ensure analytical data generated from the Wet Chemistry Laboratory, or Wet Lab, are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the customer with both routine and specialized services, field sampling guidance and materials, and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Chris Unterstein, with a B.S. degree in Chemistry, is the Wet Chemistry Supervisor and is responsible for the overall production of this laboratory; including the management of the staff and scheduling. Mr. Unterstein has over 8 years of environmental laboratory experience. In his absence, Andrew Holt assumes responsibility for departmental decisions in Wet Chemistry laboratory.

Mr. Holt, with a B.S. in Plant and Soil Science, is proficient in wet chemistry analytical methods. Mr. Holt has 9 years of environmental laboratory experience.

5.2 TRAINING

5.2.1 All new analysts to the laboratory are trained by a Chemist or the Supervisor according to ESC protocol. ESC's training program is outlined in *SOP 030205 Technical Training and Personnel Qualifications.* Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in Wet Lab analyses is demonstrated by acceptable participation in multiple proficiency testing programs (PTs) and daily Quality Control sample analyses. Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the Wet Chemistry laboratory has approximately 7,500 square feet of area, and contains LED lighting. The HVAC system is provided by a 15-ton Trane unit. The laboratory reagent water is generated through an Evoqua system. Waste disposal containers are located in the laboratory and Clean Harbors serves as ESC's waste disposal contractor. Waste handling is discussed in detail in Section 6.0 of the ESC Quality Assurance Manual. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods.
- ESC's laboratory safety guidelines are detailed in the *ESC Chemical Hygiene Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure are described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Matrices for Wet Lab environmental analyses include groundwater, wastewater, drinking water, soil, and sludge.
- Sample containers, preservation methods and holding times vary depending on analyses requested. Please see the determinative procedures for specific directions.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Wet Lab ***This table is subject to revision without notice***					
Item	***Manufacturer***	***Model***	***Instrument Name***	***Serial #***	***Location***
Analytical Balance	Mettler	AT200	Balance 1	m26291	Wet Lab
Analytical Balance	Mettler	AG204 Delta Range	Balance 2	118420883	Wet Lab
Analytical Balance	Mettler	XP205	Balance 3	1129420141	Wet Lab
Autoanalyzer	Lachat	Quikchem 8000	Lachat 2	A83000-1027	Wet Lab
Autoanalyzer	Lachat	Quikchem 8000	Lachat 3	A83000-1638	Wet Lab
Autoanalyzer	Lachat	Quikchem 8500	Lachat 4	60900000341	Wet Lab
Autoanalyzer	Lachat	Quikchem 8500	Lachat 5	60900000342	Wet Lab
Autoanalyzer	Lachat	Quikchem 8500	Lachat 6	70500000452	Wet Lab
Autoanalyzer - digestor	Lachat	BD-46	DIG1	100700000-982	Wet Lab
Autoanalyzer - digestor	Lachat	BD-46	DIG2	1000700000-982	Wet Lab
Autoanalyzer - digestor	Lachat	BD-46	DIG1	1800-871	Wet Lab
Autoanalyzer - digestor	Lachat	BD-46	DIG2	1800-872	Wet Lab
Automated titrator	Metrohm	855 titrosampler	Titrando	3256	Wet Lab
Centrifuge	Thermo	Megafuge 40	Centrifuge	41123868	Wet Lab
Class “I” weights	Troemner	Serial #7944		7944	Wet Lab
COD Reactor	HACH	45600	COD1	10800	Wet Lab
COD Reactor	HACH	45600	COD2	10090C0036	Wet Lab
Conductivity Meter	ORION	MODEL 170	ATI Orion	32470007	Wet Lab
Distillation Unit - Cyanide	Environmental Express	Distillation 1	LMD1920-106	2270	Wet Lab
Distillation Unit - Cyanide	Environmental Express	Distillation 2	LMD1920-106	2271	Wet Lab
Distillation Unit - Cyanide	Environmental Express	Distillation 3	LMD1920-106	2272	Wet Lab
Distillation Unit - Phenol	Westco Scientific	Model EASY-DIST	Dist 1	1062	Wet Lab
Distillation Unit - Phenol	Westco Scientific	Model EASY-DIST	Dist 2	1198	Wet Lab
SimpleDist	Env. Express	SC154	SimpDist1	8940CECW3871	Wet Lab
SimpleDist	Env. Express	SC155	SimpDist2	9062CECW3952	Wet Lab
SimpleDist	Env. Express	SC156	SimpDist3	9062CECW3955	Wet Lab
Flash Point Tester	Koehler	Pensky-Martens	Manual	R07002693B	Wet Lab

LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Wet Lab

This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*Serial #*	*Location*
		K16200			
Flash Point Tester	Koehler	Pensky-Martens K16201	Manual	R07002510B	Wet Lab
Flash Point Tester	LAZAR Scientific	SETA-93	Automated	1038328	Wet Lab
Hot Plate	Thermolyne Fisher	Type 2200	Hot	16237	Wet Lab
Hot Plate	Thermolyne Fisher	Type 2200	Hot	16240	Wet Lab
Hot Plate	Cole Parmer	HS19 C-P	Hot Plate	50000073	Wet Lab
Ion Chromatograph	Dionex	ICS-2000	IC5	6050731	Wet Lab
Ion Chromatograph	Dionex	ICS 1500	IC6	8100010	Wet Lab
Ion Chromatograph	Dionex	ICS 1500	IC7	8100267	Wet Lab
Ion Chromatograph	Dionex	ICS 2000	IC8	8090820	Wet Lab
Ion Chromatograph	Dionex	ICS 2100	IC9	10060822	Wet Lab
Ion Chromatograph	Dionex	ICS 2100	IC10	10091285	Wet Lab
Ion Chromatograph	Dionex	ICS 2100	IC11	11012204	Wet Lab
Ion Chromatograph	Dionex	ICS 2100	IC12	12020460	Wet Lab
Ion Chromatograph	Thermo Fisher	ICS 1600	IC13	13031204	Wet Lab
Ion Chromatograph	Thermo Fisher	ICS-2100	IC14	15030082	Wet Lab
Ion Chromatograph	Thermo Fisher	ICS-2100	IC15	15071973	Wet Lab
Ion Chromatograph	Thermo Fisher	ICS-2100	IC16	15071973	Wet Lab
Ion Chromatograph	Thermo Fisher	ICS-1600	IC17	15110462	Wet Lab
Ion Chromatograph	Thermo Fisher	ICS-2100	IC18	15120139	Wet Lab
Muffle Furnace	Thermolyne	(1) 30400	FURNACE	23231	Wet Lab
Autoanalyzer	OI Analytical	FS 3100	FS 3100-1	301831056 (NH3) 251833391 (CN)	Wet Lab
Autoanalyzer	OI Analytical	FS 3100	FS 3100-2	3168140781(NH3) 325833494 (CN)	Wet Lab
Autoanalyzer	OI Analytical	FS 3100	FS 3100-3	407831164 (NO2NO3) 403833925 (PHT)	Wet Lab
ORP Meter	YSI	ORP15	ORP	JC000114	Wet Lab
Oven - Drying	Blue M	Stabil-Therm	#1	NA	Wet Lab
Oven - Drying	Equatherm	D1576	#2	NA	Wet Lab
Oven - Drying	VWR	1305U	#3	4082804	Wet Lab
Oven - Drying	Equatherm	D1576	#4	10AW-3	Wet Lab
Oven - Drying	VWR	1305U	#5	4082104	Wet Lab
pH Meter	Fisher	AB15	AB15+	AB92329028	Wet Lab
pH Meter	Orion	410A	Orion	58074	Wet Lab

LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Wet Lab

This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*Serial #*	*Location*
pH Meter	Fisher	AB15	AB15+	AB92325899	Wet Lab
pH Meter	Thermo Fisher	Orion Versa Star	Orion VS-1	V00659	Wet Lab
Refrigerated Recirculator	Polyscience	Recirculator	Recirculator1	1282	Wet Lab
Refrigerated Recirculator	Polyscience	Recirculator	Recirculator2	1608	Wet Lab
Spectrophotometer (UV/Vis)	Hach	DR 5000	DR5000-1	1381711	Wet Lab
Spectrophotometer (UV/Vis)	Hach	DR 5000	DR5000-2	1326829	Wet Lab
Spectrophotometer	Hach	DR6000	DR6000-1	1646676	Wet Lab
Spectrophotometer	Hach	DR6000	DR6000-2	1646781	Wet Lab
TOC Analyzer	Shimadzu	Model TOC-VWS	TOC2	39830572	Wet Lab
TOC Analyzer	Shimadzu	TOC-VCPH	TOC3	H51304435	Wet Lab
TOC Analyzer	OI-Analytical	Aurora 1030	TOC4	E141788082	Wet Lab
TOC Analyzer	Shimadzu	TOC-L	TOC5	H54335232035	Wet Lab
TOC Analyzer	OI Analytical	1030	TOC6	E645732519P	Wet Lab
TOX Analyzer	Mitsubishi	TOX-100	TOX2	1035	Wet Lab
TOX Analyzer	Mitsubishi	AOX-200	AOX1	E7B00107	Wet Lab
TOX Analyzer	EST	TE Xplorer	TOX3	2015-184	Wet Lab
Turbidimeter	Hach	2100N	Turbidimeter1	941100000903	Wet Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

INSTRUMENT	*P. M. DESCRIPTION*	*FREQUENCY*
Analytical Balances	•Check with Class "I" weights	Daily
Analytical Balances	•Service/Calibration (semi-annual contract maintenance and calibration check)	Tolerance - ±0.1%
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semi-annually
Refrigerators & Incubators	•Maintenance service	As needed - determined by daily temperature performance checks
Water Bath	•Check thermometer vs. NIST	Once/year
Water Bath	•Remove from service when not maintaining temperature and send off for repair or replace	As needed
Flash Point Tester	•Check thermometer vs. certified traceable	Once/year
Lachat Autoanalyzer	•Check pump tubes, change valve flares	At least 1/month
Pensky Martens	•Check fuel level, refill	As needed
Pensky Martens	•Clean cup thoroughly	Between each test and after use
TOC	•Maintain manufacturer's service contract	Renew each year
Turbidimeter - Hach 2100A	•Illumination lamp or window (alignment and/or replacement)	Erratic or poor response
pH Meters	•Reference junction & electrode replacement	As needed
pH Meters	•Probe stored in KCl	At all times when not in use
pH Meters	•Other	As described in the manufacturer's O & M manual
Ion Chromatograph	•Replace guard and analytical columns	As needed
Ion Chromatograph	•Replace the end-line filter (P/N 045987)	As needed
Ion Chromatograph	• Replace the pump piston rinse seals and piston seals	Every 6 months or as needed
Ion Chromatograph	•Replace the sampling tip and the tubing between the tip and the injection valve.	As needed
Ion Chromatograph	•Replace lines throughout the instrument	As needed
Ion Chromatograph	•Perform Preventive Maintenance using PM kit (P/N 057954)	Annual

8.3 STANDARDS AND REAGENTS

Table 8.3A lists standard sources, receipt, and preparation information. Table 8.3B is designed to provide general calibration range information. These ranges may change depending on regulatory requirements, procedural changes, or project needs. Table 8.3C indicates the procedures and frequency for the standardization of laboratory solutions used for titrations.

Table 8.3A: Standard sources, description and calibration information.
This table is subject to revision without notice

Instrument Group	Standard Source	How Received*	Source/ Storage	Preparation from Source	Lab Stock Storage	Preparation Frequency
Alkalinity, Acidity	Lab preparation	Acidity-matrix standard grade KHP	Room temp.	0.0500N	4°± 2°C	6 months
Ammonia-Nitrogen and Total Kjeldahl Nitrogen Primary Stock	Lab preparation	ACS grade NH4Cl	Room temp.	1,000ppm stock standard	Room temp.	Annually or sooner if check samples reveal a problem
Ammonia-Nitrogen and Total Kjeldahl Nitrogen	Lab preparation	Primary Stock	Room temp.	Working Standards	Not stored	Prepared fresh as needed
COD	Lab preparation	Acid grade KHP	Dessicator	Stock solution (10,000ppm)	4°± 2°C	When absorbance of curve changes or check samples are out of control
Cyanide (Autoanalyzer)	Lab preparation	KCN	Reagent shelf	Stock solution (1,000ppm)	4°± 2°C	6 months. Working dilutions prepared daily as needed
Fluoride Primary Stock	Inorganic Standard. NSI Lab preparation	ACS grade KF	Room temp.	100ppm stock solution	Room temp.	1 year or as needed when reference standard fails
Fluoride	Lab preparation	Primary Stock	Room temp.	Dilute standards	Not stored	Prepared fresh daily
Hardness	Lab preparation	Chelometric Std. $CaCO_3$	Room temp.	1mg/mL as CaCO3	Room temp.	Annually or sooner if check samples reveal a problem
IC (Chloride, Nitrate, Nitrite, Bromide, Sulfate, Fluoride)	Commercial source	Varies	4°± 2°C	Working Standards as needed per analyte	4°± 2°C	6 months or sooner if check samples reveal a problem
IC (Chloride, Nitrate, Nitrite, Bromide, Sulfate, Fluoride)	Inorganic Standards	Varies	4°± 2°C	Working Standards as needed per analyte	4°± 2°C	Midpoint standard prepared weekly or sooner if necessary
IC (Chloride, Nitrate, Nitrite, Bromide, Sulfate, Fluoride)	NSI (2nd source)	Varies	4°± 2°C	Working Standards as needed per analyte	4°± 2°C	Prepared weekly or sooner if necessary
MBAS	Lab preparation	LAS Reference Material	4°± 2°C	1,000mg/mL working standards	4°± 2°C Wet Stored	6 months or when check standards are out of control. Prepared fresh.

Table 8.3A: Standard sources, description and calibration information.
This table is subject to revision without notice

Instrument Group	Standard Source	How Received*	Source/ Storage	Preparation from Source	Lab Stock Storage	Preparation Frequency
Nitrite-Nitrate (autoanalyzer)	Lab preparation	ACS grade KNO3	Reagent shelf	Stock solution (1000ppm)	4°± 2°C	When absorbance of curve changes or check samples are out of control
pH Meter	Commercial Source	pH 4.0 Buffer	Room temp.	No prep required	NA	Annual/Expiration Date
pH Meter	Commercial Source	pH 7.0 Buffer	Room temp.	No prep required	NA	Annual/Expiration Date
pH Meter	Commercial Source	pH 10.0 Buffer	Room temp.	No prep required	NA	Annual/Expiration Date
Phenols (autoanalyzer)	Lab preparation	ACS Certified Phenol	Reagent shelf	Stock solution (1000ppm)	4°± 2°C	Every month. Working solutions prepared daily as needed.
Phosphate	(H_2O) - Prepared in Lab Total Phos. (soils) RICCA, ERA	KH2PO4	Reagent shelf	Stock solution (50ppm as P)	Room temp.	When absorbance of curve changes or check samples are out of control. Working solutions prepared daily as needed.
Specific Conductivity Meter	NSI-Primary	ACS Certified KCl	Room temp.	Working Standard (0.01M)	Room temp.	As needed
Specific Conductivity Meter	ERA-2nd Source	ACS Certified KCl	Room temp.	Working Standard (0.01M)	Room temp.	As needed
Sulfate	Inorganic Standards, NSF Prepared in Lab	Anhydrous Na2SO4	Reagent shelf	Stock solution (100ppm)	Room temp.	When visible microbiological growth or check samples are out of control
Turbidimeter	Commercial Source Hach	Hach	Room temp.	No prep required	NA	Checked daily against Formazin Standards
pH Meter	Commercial Source	pH 1.0 Buffer	Room temp.	No prep required	NA	Annual/Expiration Date
pH Meter	Commercial Source	pH 13.0 Buffer	Room temp.	No prep required	NA	Annual/Expiration

Table 8.3B: WORKING STANDARD CALIBRATION

Analysis	Calibration Standard
Alkalinity, Acidity- Titrimetric	Primary standard grade Na_2CO_3.
Alkalinity - Methyl orange Autoanalyzer	Primary standard grade Na_2CO_3: 0, 10, 25, 50,100, 250, 375, 500 mg/L
Bromide IC	Range –1.0, 5.0, 10, 50, 100, mg/L
Chloride IC	Range –1.0, 5.0, 10, 50, 100, mg/L1
Conductivity	Standard KCl solution: 1413
Cyanides	Blank, 0.0025 – 0.40ppm. Distill one standard as check with each batch.
COD	KHP (Potassium hydrogen phthalate) standards 20 – 1000 mg/L
Chromium – Hexavalent (Colorimetric)	Blank, 0.0101, 0.0202, 0.0505, 0.1010, 0.2525, 0.5050, 1.010 mg/L
Chromium – Hexavalent (IC)	Blank, 0.5, 1.0, 2.0, 10, 20, 50, 100 ug/L
Fluoride – IC	Range –0.10, 0.50, 1.0, 5.0, 10.0, mg/L
Hardness	$CaCO_3$, chelometric standard.
Hardness (Colorimetric)	Range – 30, 50, 60, 100, 150, 200, 300 mg/L
MBAS	LAS reference material: 0.0, 0.1, 0. 5, 1.0, 1.5, 2.0 mg/L
Nitrogen-Ammonia – Autoanalyzer	Calibration standards: 0, 0.10, 0.50, 1.0, 2.0, 5.0, 10, 20 mg/L
Nitrogen-Nitrate, Nitrite – Autoanalyzer	Blank, 0.1, 0.50, 1.00 5.0, 7.0, 10.0 mg/L

Table 8.3B: WORKING STANDARD CALIBRATION	
Analysis	**Calibration Standard**
Nitrogen-Nitrate – IC	Range –0.10, 0.50, 1.0, 5.0, 10.0, mg/L
Nitrogen-Nitrite – IC	Range –0.10, 0.50, 1.0, 5.0, 10.0, mg/L
Orthophosphate, Total Phosphate	Blank, 0.025, 0.10, 0.25, 0.50, 0.75, 1.0mg/L diluted from standard KH_2PO_4
Perchlorate	Range – 0.5, 1.0, 3.0, 5.0, 10, 20, 25 mg/L
pH	Buffers1.0, 4.0, 7.0, 10, 13
Phosphate, Total	Range – 0.0, 0.1, 0.5, 1.0, 2.5, 5.0 mg/L
Phosphate – IC	Range –0.10, 0.50, 1.0, 5.0, 10.0, 15.0, 20.0 mg/L
Phenols (chloroform ext.)	Blank 0.04, 0.05, 0.10, 0.50, 1.0, 2.0mg/L Distill one standard with each batch
Solids	Gravimetric balance calibrated charts, checked with Class "I" weights in range of sample tare weights.
Sulfate – IC	Range –1.0, 5.0, 10, 50, 100, 150, 200 mg/L
Sulfide (Colormetric)	Range –0.0, 0.05, 0.1, 0.5, 1.0, 1.5, 2.0 mg/L
Sulfite	Titration
TKN	Range – 0.0, 0.1, 0.5, 1.0, 2.5, 5.0, 10, 20 mg/L
Turbidity	Range –0, 20, 200, 1000, 4000NTU
TOC	Range –0, 1.0, 2.5, 5.0, 7.5, 10, 20, 50, 75, 100 mg/L
TOX	Cell checks at 1, 20, 40 ug

Table 8.3C: STANDARDIZATION OF TITRATION SOLUTIONS		
Solution	**Primary Standard**	**Frequency**
0.0200 N NaOH	0.050 N KHP	Daily as needed
0.0200 N H_2SO_4	Freshly prepared and standardized NaOH (from KHP standard)	6 months or with each new batch
0.0141 N Hg $(NO_3)_2$	Standard NaCl solution 500 ug Cl/ml	Daily as used
0.0100 M EDTA	Standard $CaCO_3$ solution 1 mg $CaCO_3$/liter	Daily as used

8.4 INSTRUMENT CALIBRATION

Total Organic Carbon Analyzer (TOC) in GW/WW – SOP Number 340356A

The TOC standard curve is prepared using a minimum of five standards. Linear regression is used for quantitation with the correlation coefficient being at least 0.995. The calibration range is 1.0mg/L to 100mg/L. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recover within 10% of the expected value for each analyte.
A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±15% of the expected concentration.

Total Organic Carbon Analyzer (TOC) in DW – SOP Number 340356B

The TOC standard curve is prepared using a minimum of five standards. Linear regression is used for quantitation with the correlation coefficient being at least 0.995. The calibration range is 0.5mg/L to 5.0mg/L. During the analytical sequence, the

stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recover within 10% of the expected value for each analyte.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±15% of the expected concentration. Dissolved organic carbon can be analyzed using this procedure by filtering the unpreserved sample using a 0.45um filter, then performing the analysis on the filtrate using the same process as the TOC procedure.

Total Organic Carbon Analyzer (TOC) in Soil (Walkley Black) – SOP Number 340368

The Walkley Black standard curve is prepared using a minimum of six standards. Linear regression is used for quantitation with the correlation coefficient being at least 0.995. The calibration range is 0.1mg/L to 5.0mg/L. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recover within 10% of the expected value for each analyte.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±50% of the expected concentration. This method is used to determine Fractional Organic Carbon (FOC) as required by the state of Indiana.

Total Organic Halogen Analyzer (TOX) – SOP Number 340360

The cell performance of the TOX analyzer is verified at the beginning of each analytical sequence in the low, mid and high ranges. The verifications must recover within 3% of the expected target value. The instrument performs a linear regression using the values determined with the required correlation coefficient being at least 0.995. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recover within 10% of the expected value for each analyte.
A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±15% of the expected concentration.

Anions by Ion Chromatography – SOP 340319

Least Squares Linear Regression is the primary method of quantitation; where a minimum of five standards is used and the correlation coefficient must be at least 0.995 for each analyte of interest. The calibration range varies depending upon the analyte(s) to be determined. During the analytical sequence, the stability of the initial calibration is

verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recover within 10% of the expected value for each analyte, except during the analysis of groundwater and soil using EPA Method 9056 that must recover within 5%.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±10% for water samples and ±15% of the expected concentration for soil samples.

Hexavalent Chromium by Ion Chromatography – SOP 340372 & 340372A

These procedures are utilized to analyze for hexavalent chromium (Cr6+) by ion chromatography using a variety of published methods and the relevant SOP addresses both the common and method specific requirements for each published method. The Cr^{6+} standard curve is prepared using a minimum of five or six standards at various levels depending on the expected concentration of the field samples, the analytical method requested and the matrix. Linear regression is used for quantitation with the correlation coefficient being at least 0.995. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The recovery of the CCV must be within 10% of the expected value for the analyte using SM 3500Cr C and EPA Method 7199. The CCV for EPA 218.6 must recover within ±5% and the mid-level CCV for EPA 218.7 must recover within ±15%.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±10% of the expected concentration.

Aqueous and solid Hexavalent Chromium samples can also be analyzed by colorimetry using EPA 7196A and SM 3500Cr B – SOP 340318B & 350318C. Specific requirements for those methods are contained within the specified SOPs. Soil samples are prepared for both the IC and colorimetric method using alkaline digestion found in EPA 3060A and discussed in both soil SOPs 350318C and 340372A.

Gravimetric Analyses – Various SOPs

Gravimetric analyses are performed using several different published methods, including TDS, TSS, TVDS, TS, TVS, VSS, Settleable Solids, Total Particulates, and Respirable Particulates. Calibration for these methods require use of Class I weights and a properly performing and verified balance. Where possible, laboratory control standards are analyzed in conjunction with field sample analysis to verify that the analytical process is performing accurately. Sample duplicate analyses also provide verification that the analytical process is performing as required.

Auto-Analyzer (Lachat) – Various SOPs

The Autoanalyzer calibration curve is prepared using a minimum of five standards. For most analyses, linear regression is used for quantitation with the correlation coefficient being at least 0.995. The calibration range varies depending upon the analyte to be determined. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. Routinely, the CCV must recover within 10% of the expected value for each analyte, but is dependent on the analyte of concern, the matrix of the sample and the determinative method.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±15% of the expected value, except for cyanide, ammonia, total phosphorus, NO2NO3 and TKN where ±10% applies.

Perchlorate in Drinking Water – ESC SOP 340370

The Ion Chromatograph calibration curve is prepared using a minimum of five standards. The instrument performs a linear regression using the values determined with the required correlation coefficient being at least 0.995. During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recover within 15% of the expected value for each analyte.

A laboratory control standard (LCS) is prepared from a source that is independent from the calibration standards and used to verify that the calibration curve is functioning properly and that the analytical system performs acceptably within a clean matrix. The LCS must recover within ±10% of the expected concentration.

8.5 ACCEPTANCE/REJECTION OF CALIBRATION

All new standard curves are immediately checked with a laboratory control standard from a separate source than that used for calibration. All curves are visually reviewed to ensure that acceptable correlation represents linearity. Calibration curves may be rejected for nonlinearity, abnormal sensitivity, or poor response of the laboratory control standard. Specific criteria for each instrument are outlined in Table 8.5.

Continuing calibration is performed following every tenth sample. If a check standard does not perform within established criteria then the instrument is evaluated to determine the problem. Once the problem is corrected, all samples between the last “in control” sample and the out of control check are re-analyzed.

TABLE 8.5: INSTRUMENT CALIBRATION

Instrument (Analysis)	Calibration Type	Number of Standards	Type of Curve	Acceptance/Rejection Criteria	Frequency
pH Meter*	Initial	5 (buffers) 1 reference buffer	Log.	Third pH of a different value buffer must read within 0.05 units of true value	Daily as used
	Continuing	1 buffer (may be any certified buffer)		Buffer solution must read within 0.05 units of true value	Every 10th sample; Field**
Conductivity Meter*	Initial	1	1 point	Calculation of cell constant between 0.95 - 1.05	Daily as used
	Continuing	1		Must be within 5% of true value	Every 10th sample; Field**
Turbidimeter *	Initial	5	Linear	Formazin-confirmed Gelex standards in appropriate range. Check with second standard must be within 5%	Daily as used
	Continuing	1 reference of different value, 1 (high-level)		Must be within 5% of true value	Every 10th sample; Field**
UV/VIS Spec.	Initial	At least 5 standards calibration standards	Linear	Calibration Curve must have a correlation of 0.995 or better	Daily as used
		2 laboratory control standard		Must be within $\pm$ 15% of the calibration curve.	Daily as used
	Continuing	1 mid-level reference std.		Must be within 90 – 110%	Every 10th sample
Total Organic Halogen Analyzer	Initial	3 calibration standards	Linear	Calibration Curve must have a correlation of 0.995 or better	Daily as used
		1 laboratory control standard		Laboratory control standard must agree within $\pm$ 15% of calibration curve	Daily as used
	Continuing	1 mid-level reference std.		Must be within 90 – 110%	Every 10th sample
Total Organic Carbon Analyzer	Initial	5 calibration standards	Linear	Calibration Curve must have a correlation of 0.995 or better	Every 6 months or as needed
		2 laboratory control standard		Laboratory control standard must agree within $\pm$ 15% of calibration curve	Daily as used
	Continuing	1 mid-level reference std.		Must be within 90 – 110%	Every 10th sample

Note: ESC defines a "laboratory control standard" as a standard of a different concentration and source than those stock standards used for calibration.
*This equipment is also calibrated and used in the field.
**Field equipment must be checked every 4 hours and at the end of the day.

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent grade water is obtained from either a Barnstead NANOpure Diamond system or the Millipore Milli-Q Academic A-10 system.

9.2 GLASSWARE WASHING AND STERILIZATION PROCEDURES

General

Routine laboratory glassware is washed in a non-phosphate detergent and warm tap water. Before washing all labeling and large deposits of grease are removed with acetone. Glassware is then rinsed with: tap water, "No Chromix" solution, tap water, and deionized (DI) water. Glassware is stored in designated drawers or on shelves, inverted when possible. All glassware is rinsed with the required solvent, prior to use. DI water is then used as a precaution against airborne contamination

Phosphate Glassware

Glassware involved in phosphate analysis is marked and segregated. All labels and markings are removed from the glassware prior to washing. The glassware is then washed using hot water and a non-phosphorus detergent. It is then rinsed thoroughly in hot water followed by a rinse in DI water. It is rinsed in 1:1 HCl followed by a final rinse of DI water. If the phosphate glassware has not been used recently, it is the responsibility of the analyst to rinse the glassware with warm 1+9 hydrochloric acid prior to use.

Nutrients and Minerals Glassware

All labels and markings are removed from the glassware prior to washing. The glassware is then washed using hot water and detergent. It is then rinsed thoroughly in hot water followed by a rinse in DI water. It is rinsed in 1:1 HCl followed by a final rinse of DI water.

Immediately prior to use, the ammonia glassware is rinsed in DI water. Routine blanks are run on ammonia glassware to ensure that the detergent is contaminant free.

Non-Metals (CN, COD) Glassware

All labels and markings are removed prior to washing. The glassware is soaked in hot soapy water followed by a thorough rinse with hot tap water. A final rinse of DI water is then performed.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the Wet Lab can be found in the following table:

TABLE 10.1: WET LAB DEPARTMENT SOPs

This table is subject to revision without notice

SOP #	Title
340300	Acidity (SM 2310B)
340301	Alkalinity (Titrimetric)
340302	Alkalinity - Lachat
340305	Chlorine, Total Residual DPD- 330.5 SM4500-CL-G
340307	Cyanide- All Forms (Colorimetric Automated UV) - Lachat
340307	Cyanide- OI Method
340309	Chemical Oxygen Demand
340310	Color by Visual Comparison (SM2120B, EPA 110.2)
340313	Density (Specific Gravity)
340317	Total Hardness (mg/l as CaCO3) - (Titrimetric)
340317	Total Hardness by Lachat Method 130.1
340318	Hexavalent Chromium (Colorimetric) Soil 3060A/7196A
340318	Hexavalent Chromium (Colorimetric) Water 7196A
340319	Ion Chromatography - Anions by 300.0, SM 4110B and 9056/9056A
340319	Ion Chromatography - Anions OH VAP
340325	MBAS (Methylene Blue Active Substances)
340327	Ammonia, Phenolate (OI)
340327	Ammonia, Phenolate (Lachat)
340328	Organic Nitrogen
340331	Threshold Odor Test
340333	Nitrate/Nitrite (Lachat Autoanalyzer)
340333	Nitrate/Nitrite (OI Autoanalyzer)
340334	Paint Filter Test
340335	pH/Corrosivity
340336	Phenol - 4AAP (Lachat Autoanalyzer)
340338	Total Phos GW/WW (365.4) Colorimetric
340338	Total Phos.(361.2, 4500P-B/F) Colorimetric
340338	Orthophosphate (365.2,4500P-E) Colorimetric
340339	Reactivity
340340	Reactive Cyanide/Sulfide Distillation
340342	Specific Conductance (120.1, 2510B)
340344	Sulfide (Colorimetric Methylene Blue) (376.2)
340344	Sulfide Acid-soluble,and acid-insoluble Method 9034
340345	Sulfite
340346	Settleable Solids
340347	Total Dissolved Solids
340348	Total Suspended Solids (Non-Filterable Residue)
340349	Total Solids/Percent Moisture

SOP #	Title
340350	Total Volatile Solids
340352	Total Kjeldahl Nitrogen
340354	Turbidity
340356	Total Organic Carbon In Soils (loss of weight on ignit.
340356	TOC for Drinking Water only
340356	Total Organic Carbon (TOC) and Total Inorganic Carbon (TIC) using Shimadzu 5000A for GW and WW
340357	Ignitability
340359	UV254
340360	TOX (total organic halides)
340361	Ferrous Iron, SM-3500-Fe-B
340362	Heat of Combustion
340365	Particles Not Otherwise Regulated, Total (PNOR) NIOSH 0500
340366	Oxidation Reduction Potential
340367	Extractable Organic Halides
340368	TOC in Soil (Walkley-Black)
340369	Carbon Dioxide by Calculation
340370	Perchlorate in DW
340371	Chlorine in Oil (ASTM D808-00)
340372	Hexavalent Chromium in Soil by IC (3060A/7199)
340372	Hexavalent Chromium in Water by IC (218.7/SM 3500Cr)
340373	Organic Matter (FOM) and Fractional Organic Carbon (FOC)
340374	Total Volatile Dissolved Solids (TVDS)
340375	Hexavalent Chromium in Air by IC
340376	Total Organic Halides in Oil (EPA 9076)
340377	Manual Nitrocellulose Analysis
340378	Volatile Suspended Solids
340379	Guanidine Nitrate by IC
340381	Ash in Petroleum Products (ASTM D482-07)

11.0 QUALITY CONTROL CHECKS

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

11.1 ESC participates in proficiency testing (PTs) in support of various laboratory accreditations/recognitions. Environmental samples are purchased from Phenova. The WS, WP and solid matrix studies are completed every 6 months.

11.2 Initial Demonstrations of Capability (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing Demonstration of Capability (CDOCs) must be updated at least annually. The associated data is filed within the department and available for review.

11.3 Where appropriate, Matrix Spike and Matrix Spike Duplicates are performed on each batch of samples analyzed, depending on analytical method requested.

11.4 A Laboratory Control Sample (LCS) is analyzed once per batch of samples. Where appropriate, an LCS Duplicate may also be analyzed.

11.5 Where appropriate, a method preparation blank is performed per batch of samples processed. If one-half the reporting limit [RL] is exceeded, the laboratory shall evaluate whether reprocessing of the samples is necessary, based on the following criteria:

- The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparation batch or
- The blank contamination is greater than 1/10 of the specified regulatory limit.

The concentrations of common laboratory contaminants shall not exceed the reporting limit. Any samples associated with a blank that fail these criteria shall be reprocessed in a subsequent preparation batch, except when the sample analysis resulted in non-detected results for the failing analytes.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in ESC SOP #030201, *Data Handling and Reporting.* A secondary review of the data package using the ESC SOP #030227, *Data Review*. The reviewer verifies that the analysis has been performed as required and meets method criteria, all associate data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required qualifiers on test reports, etc.)

TABLE 12.1: Data Reduction Formulas

PARAMETER	FORMULA
Acidity, Alkalinity	$\frac{\text{mL titrant x normality titrant x 50,000}}{\text{mL sample}}$
COD, Sulfate	Concentration from curve x dilution factor
Orthophosphate, Hexavalent Chromium	Calculated by computer software as provided by HACH Corp.
Nitrogen-Nitrate, Phenols,Nitrogen-Ammonia, Total Phosphate, Nitrogen-Total Kjeldahl**	Calculated by computer software as provided by Lachat Corp.
Anions, Hexavalent Chromium	Calculated by computer software as provided by Dionex
Conductivity*, pH, Turbidity,	Directly read from instrument
Cyanide, Total and Amenable	$\frac{\text{µg from standard curve x mL total volume absorbing solution}}{\text{mL volume sample x mL volume of absorbing solution colored}}$ *Calculated by software as provided by Lachat Corp.*
Solids, Total and Total Dissolved	$\frac{\text{((mg wt of dried residue + dish) - mg wt of dish) x 1000}}{\text{mL sample}}$

PARAMETER	FORMULA
Solids, Total Suspended	((mg wt of dried residue + filter) - mg wt of filter) x 1000 / mL sample

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.3 by method for current QC targets, controls and current reporting limits.

12.3 REPORTING

Reporting procedures are documented in *SOP 030201 Data Handling and Reporting.*

Inorganic Control Limits: Inorganic QC targets are statutory. The laboratory calculated limits verify the validity of the regulatory limits. The Wet Lab QC targets for all inorganic analyses are within the range of $\pm$ 5 to 15% for accuracy, depending on determinative method requirements, and, where applicable, $\leq$20 RPD for precision, unless laboratory-generated data indicate that tighter control limits can be routinely maintained. When using a certified reference material for QC sample analysis, the acceptance limits used in the laboratory will conform to the provider's certified ranges for accuracy and precision.

Table 12.3: QC Targets for Wet Lab Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppm)
Acidity	SM 2310B	w	85 - 115	<20	10
Acidity	SM 2310B	s	85 - 115	<20	10
Alkalinity	SM 2320B	w	85 - 115	<20	20
Ammonia	350.1, SM 4500-NH3-B	w	90 - 110	<20	0.25
Ammonia	350.1 (mod.)	s	Certified Values	<20	5.0
Ash	ASTM D482-07	s	90 - 110	<20	n/a
Bromide	300.0/9056/9056A/ SM 4110B	w	90 - 110	<20	1.0
Bromide	9056/9056A	s	Certified Values	<20	10
Chloride	300.0/9056/SM 4110B	w	90 - 110	<20	1.0
Chloride	9056A	w	90 - 110	<15	1.0
Chloride	300.0/9056	s	Certified Values	<20	10
Color	SM 2120B	w	n/a	<20	1 CU
Conductivity	120.1/9050A, 2510B	w	85 - 115	<20	n/a
Cyanide	335.4, 335.2 (CLP-	w	90 - 110	<20	0.005

Table 12.3: QC Targets for Wet Lab Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppm)
	M), 9012B, SM 4500-CN-E				
Cyanide	335.2 (CLP-M), 9012B	s	Certified Values	<20	0.25
Ferrous Iron	3500FE B	w	85 - 115	<20	15
Fluoride	300.0/9056/9056A/ SM 4110B	w	90 - 110	<20	100
Fluoride	9056A	s	Certified Values	<20	1.0
Hardness	130.1	w	85 - 115	<20	30
Hardness	130.2/SM 2340C	w	85 - 115	<20	5.0
Hexavalent Chromium	SM3500 Cr B/7196A	w	85 - 115	<20	10
Hexavalent Chromium	7196A	s	Certified Values	<20	2.0
Hexavalent Chromium	7199	w	90 - 110	<20	0.0005
Hexavalent Chromium	218.7	w	85 - 115	<15	0.00002
Hexavalent Chromium	7199	s	80 - 120	<20	1.0
Ignitability	1010A	w/s	±3 degrees C	<20	n/a
Methylene Blue Active Substances	5540C SM20th	w	85 - 115	<20	0.10
Nitrate-Nitrite	300.0/9056/9056A/ SM 4110B	w	90 - 110	<20	1.0
Nitrate-Nitrite	9056A	w	90 - 110	<15	1.0
Nitrate-Nitrite	300.0/9056	s	Certified Values	<20	10
Nitrate	300.0/9056/SM 4110B	w	90 - 110	<20	0.1
Nitrate	9056A	w	90 - 110	<15	0.1
Nitrate	300.0/9056	s	Certified Values	<20	1.0
Nitrite	300.0/9056/SM 4110B	w	90 - 110	<20	0.1
Nitrite	9056A	w	90 - 110	<15	0.1
Nitrite	300.0/9056	s	Certified Values	<20	1.0
pH	SM 4500-H, 9040C	w	n/a	<1	n/a
pH	9045D	s	n/a	<1	n/a
Phosphate (ortho)	SM 4500-P E	w	85 - 115	<20	25
Phosphate (ortho)	SM 4500-P E	s	85 - 115	<20	250
Phosphorous/Total	365.1, SM 4500-P	w	90 - 110	<20	3.0
Phosphorous/Total	365.4	w	90 - 110	<20	100
Phosphorous/Total	9056	s	Certified Values	<20	1.0
Residual Chlorine	SM 4500Cl G	w	90 - 110	<20	0.1
Residue, Total (TS)	SM 2540-B, SM2540-G	w	85 - 115	<20	10
Residue, Total (TS)	SM2540-G	s	85 - 115	<20	100
Residue, Filterable	SM 2540-C	w	95 - 105	<20	10

Table 12.3: QC Targets for Wet Lab Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppm)
(TDS)					
Residue Non-Filterable (TSS)	SM 2540-D	w	95 - 105	<20	2.5
Residue, Total Volatile (TVS)	SM 2540-E	w	80 - 120	<20	1.0 (% of TS)
Residue, Total Volatile (TVS)	160.4/SM 2540-E,	s	80 - 120	<20	1.0 (% of TS)
Sulfate	300.0/9056/SM 4110B	w	90 - 110	<20	5.0
Sulfate	9056A	w	90 - 110	<15	5.0
Sulfate	300.0/9056	s	Certified Values	<20	50
Sulfide	SM 4500S2 D	w	85 - 115	<20	20
Sulfite	SM 4500SO3 B	w	85 - 115	<20	3.0
Total Kjeldahl Nitrogen	351.2	w	90 - 110	<20	0.25
Total Kjeldahl Nitrogen	SM 4500NOrg C	s	Certified Values	<20	20
Total Organic Carbon	415.1, SM 5310B,9060A	w	85 - 115	<20	1.0
Total Organic Carbon	SM 5310C	w	85 - 115	<20	0.5
Total Organic Carbon	USDA LOI, ASTM F1647-02A	s	50 - 150	<20	10
Total Organic Carbon	Walkley-Black,	s	50 - 150	<20	100
Dissolved Organic Carbon	415.1, SM 5310B,9060A	w	85 - 115	<20	1.0
Dissolved Organic Carbon	SM 5310C	w	85 - 115	<20	0.5
Total Organic Halogens	9020A, SM 5320B	w	85 - 115	<20	0.1
EOX	9023	s	85 - 115	<20	25
Total Phenol	420.2	w	90 - 110	<20	0.04
Total Phenol	9066	w	90 - 110	<20	0.04
Total Phenol	9066	s	90 - 110	<20	0.67
Turbidity	180.1, SM 2130B	w	90 - 110	<20	0.1 NTU

13.0 CORRECTIVE ACTIONS

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CARs are kept on file by the Regulatory Affairs Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these control limits are exceeded, corrective action must be taken. Calculated sample spike control limits are also used.

All samples and procedures are governed by ESC's quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP.

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory, the method criteria takes precedence.

13.2.2 Calibration Verification Criteria Are Not Met: Inorganic Analysis

Rejection Criteria - See Table 8.5.

Corrective Action - If a standard curve linearity is not acceptable and/or the absorbance for specific standard(s) is not analogous to historic data, the instrument settings, etc. are examined to ensure that nothing has been altered, clogged, etc. Check the standard curve for linearity and re-analyze the standards once. If the failure persists, the working standards are made fresh, intermediate dilutions are re-checked and the instrument is re-calibrated. If a problem persists, the Supervisor or Regulatory Affairs Department is notified for further action.

If the initial reference check sample is out of control, the instrument is re-calibrated and the check sample is re-analyzed. If the problem continues the check sample is re-prepared. If the problem still exists then the standards and reagent blank are re-prepared. If the problem persists, the Supervisor or Regulatory Affairs Department is notified for further action.

13.2.3 Out Of Control Blanks: Applies to Method, Trip, Rinsate & Instrument Blanks

Rejection Criteria - Blank reading is more than twice the background absorbance or more than MDL.

Corrective Action - Blanks are re-analyzed and the response is assessed. Standard curves and samples are evaluated for any obvious contamination that may be isolated or uniform throughout the run. If necessary, reagents are re-prepared. Field sample analyses are not started until the problem is identified and solved. If samples have already been partially prepared or analyzed, the Supervisor or Regulatory Affairs Department is consulted to determine if data needs to be rejected or if samples need to be re-prepped.

13.2.4 Out Of Control Laboratory Control Standards (LCS)

Rejection Criteria - If the performance of associated laboratory control sample(s) is outside of control limits either method defined or calculated as the mean of at least 20 data points ± 3 times the standard deviation of those points. (Listed in Section 12).

Corrective Action - Instrument settings are checked, LCS standard is re-analyzed. If the LCS is still out of control, re-calibration is performed, and samples affected since the last "in control" reference standard are re-analyzed. The Supervisor or Regulatory Affairs Department is consulted for further action.

13.2.5 Out Of Control Matrix Spike Samples

Rejection Criteria - If either the MS or MSD sample is outside the established control limits.

Corrective Action - Any compound that is outside of these limits is considered to be 'out of control' and must be qualified appropriately. Batch acceptance, however, is based on method blank and LCS performance, not on MS/MSD recoveries. Specific methods, customers, and programs may require further corrective action in some cases.

13.2.6 Out Of Control Duplicate Samples

Rejection Criteria - Lab-generated or method required maximum RPD limit (as listed under precision in Section 12)

Corrective Action - Instrument and samples are checked to see if precision variance is likely (i.e., high suspended solids content, high viscosity, etc.). They are re-analyzed in duplicate and samples just preceding and following the duplicated sample are re-analyzed. If problem still exists, the Supervisor or Regulatory Affairs Department is notified to review the analytical techniques.

13.2.7 Out Of Control Calibration Standards: ICV, CCV, SSCV

Rejection Criteria - If the performance is outside of method requirements.

Corrective Action - Instrument settings are checked, calibration verification standard is reanalyzed. If the standard is still out of control, re-calibration is performed, and samples affected since the last "in control" reference standard are re-analyzed. The Supervisor or Regulatory Affairs Department is consulted for further action.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #030230, *Standards Logger, SOP #030227, Data Review* and SOP #030201, *Data Handling and Reporting*

All calibration data and graphs generated for wet chemistry are kept digitally with the following information: date prepared, calibration concentrations, correlation, and analyst initials. The analyst reviews the calibration and evaluates it against acceptance criteria before placing it in the calibration notebook. Data on initial and continuing reference standards, as well as matrix spikes and duplicates, are entered in the QC box generated on each analysis page. If a test allows the use of a previously established calibration curve then the calibration check standard is reviewed against acceptance criteria and if acceptable, analysis can proceed. In this situation the calibration date is referenced so that the curve can be easily reviewed, if necessary.

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual *Version 13*.0 and *SOP #010104, Internal Audits*.

16.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix IV)	General – Replaced the term “client” with the term “customer” Section 6.1 – Updated to reflect current facilities Section 7.1 – Removed IH test Table 8.1 – Updated Equipment List Section 12.3 – Removed IH QC Table Table 12.3 – Updated RLs

1.0 SIGNATORY APPROVALS

Metals Department
QUALITY ASSURANCE MANUAL

APPENDIX V TO THE ESC
QUALITY ASSURANCE MANUAL

for

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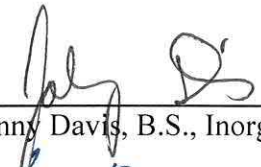
NOTE: The QAM has been approved by the following people.



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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that data generated from the Metals Laboratory is scientifically valid and is of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the customer with both routine and specialized services, field sampling guidance and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

John Davis, with a B.S. degree in Biology, is the Department Supervisor and is responsible for the overall production of these laboratories; including the management of the staff and scheduling. Mr. Davis has 13 years of environmental laboratory experience. In his absence, Rodney Street assumes responsibility for departmental decisions in the Metals Department.

Mr. Rodney Street, with a B.S. degree in Medical Technology, is the Technical Specialist for the Metals Lab. He is proficient in inorganic analytical methods and has 34 years of environmental laboratory experience.

5.2 TRAINING

Senior Analysts or the Supervisor trains all new analysts to the laboratory according to ESC protocol. ESC's training program is outlined in *SOP 030205 Technical Training and Personnel Qualifications.* Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in metals analysis and preparation is also demonstrated by acceptable participation in multiple proficiency testing programs (PTs) and using daily Quality Control sample analyses. Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the analysis laboratory has approximately1200 square feet with roughly 90 square feet of bench area. The main area of the metals prep laboratory has approximately 1200 square feet with 232 square feet of bench area. The main area of the Mercury/TCLP laboratory has approximately 1272 square feet with 136 square feet of bench area. The lighting standard in all three labs is fluorescence. The air system is a 15-ton make-up unit plus 15-ton HVAC with electric heat. The laboratory reagent water is provided through the US Filter deionizer system. Waste disposal containers are located in the laboratory and Clean Harbors serves as ESC's waste disposal company. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods.
- ESC's laboratory safety guidelines are detailed in *the ESC Chemical Hygiene Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Matrices for metals analysis are as follows: groundwater, wastewater, drinking water, soil, sludge, paint chips, wipes, filters, and leachates.
- Sample containers, preservation methods and holding times:
  - Glass containers are acceptable for all elements except Boron and Silicon. Plastic must be used for Boron and Silicon.
  - Water samples that are analyzed for dissolved metals must be filtered using a 0.45µm pore membrane. Water samples for total metals are not filtered. All water samples are acidified with 1+1 nitric acid to a pH<2. Filtered water samples (dissolved metals) are preserved immediately after filtration. All other water samples are preserved immediately after sampling. Water samples are not refrigerated prior to analysis.
  - Paint chips, dust wipes and filters do not require preservation.
  - Soil samples for all metals are stored not frozen but ≤6°C.
  - Hold times for all metals, except Mercury, are 180 days. Mercury has a hold time of 28 days.

8.0 EQUIPMENT

Instrument Software

- Agilent ICPMS 7700 and 7900 - Mass Hunter - Used for calibration, calculation, QC review, diagnostics, and data storage
- Thermo 7400 ICP - Qtegra - Used for calibration, calculation, QC, review, diagnostics, data storage
- Leeman Hydra II AA – Envoy - Used for calibration, calculation, QC review, diagnostics, data storage
- Perkin Elmer Fims 100- Winlab- Used for calibration, calculation, QC review, diagnostics, data storage

NOTE: All purchased software that is used in conjunction with software specific instruments is guaranteed by the supplier to function as required. The supplier of the software performs all troubleshooting or software upgrades and revisions.

8.1 EQUIPMENT LIST

Table 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Metals Analysis and Preparation
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Name*	*#*	*Serial number*	*Location*
Balance- Top Loading	Trobal	AGN100		1	701001026	Metals Prep Lab
Balance - Top Loading	Mettler Toledo	PB3002-5		1	1119070828	Metals Prep Lab
Balance - Top Loading	Mettler Toledo	PB3002-5		1	71242213216	Mercury Lab
Balance - Top Loading	Mettler Toledo	PB3002-5		1	1121462199	Metals Prep Lab
Hot Block	Env. Express	SC154	C	1	3994CEC1880	Metals Prep Lab
ICPMS with autosampler	Agilent	7700	ICPMS7	1	JP12482187	Metals Lab
ICPMS with autosampler	Agilent	7900	ICPMS8	1	JP14080166	Metals Lab
ICPMS with autosampler	Agilent	7900	ICPMS9	1	JP14400452	Metals Lab
ICP Simultaneous with autosampler	Thermo	7400	ICP12	1	IC74DC141801	Metals Lab
ICP Simultaneous with autosampler	Thermo	7400	ICP13	1	IC74DC143804	Metals Lab
ICP Simultaneous with autosampler	Thermo	7400	ICP14	1	IC74DC151103	Metals Lab
Hot Block	CPI	Mod Block	HGA	1	004412	Mercury Lab
Hot Block	CPI	Mod Block	HGB	1	604443	Mercury Lab
Hot Block	CPI	Mod Block	MPA	1	4430	Metals Prep Lab
Hot Block	CPI	Mod Block	MPB	1	4434	Metals Prep Lab
Mercury Auto Analyzer	Perkin Elmer	(1) FIMS 100	III	1	110156051101	Mercury Lab
Mercury Auto Analyzer	Perkin Elmer	FIMS 100	IV	1	101S11061403	Mercury Lab
Mercury Auto Analyzer	Leeman	Hydra II AA	HG5	1	Install #65043	Mercury Lab

Table 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Metals Analysis and Preparation ***This table is subject to revision without notice***						
Item	***Manufacturer***	***Model***	***Name***	***#***	***Serial number***	***Location***
Microwave	CEM	MARS Xpress	NA	1	MD-2861	Metals Prep Lab
Microwave	CEM	MARS Xpress	NA	1	MD-9972	Metals Prep Lab
Microwave	CEM	MARS Xpress	NA	1	MD-9640	Metals Prep Lab
Microwave	CEM	MARS Xpress	NA	1	MD-4692	Metals Prep Lab
Microwave	CEM	MARS 6	NA	1	MJ2771	Metals Prep
Microwave	CEM	MARS Xpress	NA	1	MD-7441	Metals Prep
Prep station	Seal Analytical	Deena II	NA	1	020050	Metals Prep
Prep Station	Env. Express	Automated prep station	Autoblock 3	1	AB1002-0708-001	Metals Prep Lab
TCLP Extraction Unit	Env. Express	6 Position	NA	1	NA	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	5	4803-12-542	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	5	1918-12-415	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	5	1918-12-414	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	5	5152-12-548	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	2	NA	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	2	NA	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	2	NA	TCLP Lab
TCLP Extraction Unit	Env. Express	12 Position	NA	2	NA	TCLP Lab
TCLP Extraction Unit	Env. Express	10 Position	NA	1	NA	TCLP Lab
TCLP Extraction Unit	Env. Express	Teflon Vessels	NA	12	NA	TCLP Lab
TCLP Zero Headspace Extractor	Env. Express	Vessels	NA	41	NA	TCLP Lab
Centrifuge	Thermo	Sovall ST40	NA	1	41179863	Metals Prep
Turbidimeter	HACH	2100N	NA	1	05090C020685	Metals Prep Lab
Water Purification - Nanopure	Elga	Pure Lab Ultra	NA	1	ULT00002665	Metals Prep Lab
PH Meter	Orion Versastar	VSTAR50	NA	1	V04967	TCLP Lab
Balance	Mettler Toledo			1	B246522879	TCLP Lab
Auto pipetters 1000µl to 20 µl	Oxford	Varies	NA		NA	Metals Lab
Auto pipetters	Eppendorf, Oxford	Varies	NA		NA	Metals Prep Lab
MAX/MIN Thermometer	Fischer Scientific	MAX/MIN	TCLP #1		122376671	TCLP Lab
Hotplate/Stirrer	Thermo Cimarec	SP88850100		1	C3010013111514115	TCLP Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

INSTRUMENT	P. M. DESCRIPTION	FREQUENCY
ICP and ICPMS	•Maintain manufacturer's service contract	Renew annually
ICP and ICPMS	•Pump tubing, torch alignment, o-ring, injector tip and torch	Check daily and adjust/change as needed
ICPMS	•Sampler and Skimmer cones	Clean or replace when needed
ICP and ICPMS	•Pump rollers	Clean and lubricate when needed
ICP and ICPMS	•Nebulizer	As needed
Mercury Analyzer	•Calibrate and check sensitivity with previous data	Daily with use
Mercury Analyzer	•Response factor problems, check tubing for leaks, particularly in pump head, and check cell for fogging	As needed
Mercury Analyzer	•Replace desiccant in tube	With each use
Mercury Analyzer	•Check rotometer for airflow, if inadequate, replace flex tubing in pump lead	As needed
TCLP Apparatus (ZHE)	•Change O-rings	As needed
Thermometer	•All working thermometers are compared to a NIST thermometer.	Semi-annually
pH Meter	•Calibrated according to manufacturer's instructions. •The slope is documented and acceptable range 95-105%	Daily
Analytical Balance	•Analytical balances are checked and calibrated by a certified technician semi-annually. •Calibration is checked daily with class S weights. Must be within 0.1% S class weights calibrated annually	Semi-annually Daily
TCLP Tumblers	•Visually timed and confirmed to be 30±2 rpm.	Monthly
Microwaves	•Checked and calibrated by a certified technician	Semi-annually, calibrated weekly by staff
Microwaves	Check cap membranes for leaks	As needed

8.3 STANDARDS AND REAGENTS

All reagents and standards must meet the requirements listed in the analytical methods.

Table 8.3A: Stock Standard sources, receipt, and preparation information.
(subject to revision as needed)

STOCK STANDARD SOURCES
ICP metals used – Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn, S
ICP/MS metals used – Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn, B, U, Th, Na, Ca, Mg, K, Al, Ti, Sr

Instrument Group/Standard	*Standard Source**	*How Received**	*Source/ Storage*	*Lab Stock Storage*	*Receipt Frequency*
ICP/CCVLL	Env. Express	4ppm-Al 2ppm- Fe 20ppm-Ca, K, Na, Mg, S 1ppm- B, Si, Zn, Sn, Ti 0.04ppm-Be, Cd 0.1ppm-Pb, Mo, Ba, Ag 0.2ppm-Cr, Co, Cu, Sb, As, Ni, Se, Tl Mn, Sr, 0.4ppm- V 0.3ppm- Li	Room temp.	2% HNO3 w/ Tr HF	Annual/Expiration Date
ICP (single element standards)	Env. Express or High Purity	1000ppm	Room temp.		Annual/Expiration Date
ICP/ICV	Inorganic Ventures	500ppm – Al. Ca, Fe, Mg, Na, K, S 50ppm – All others 20ppm - Sr	Room temp.	5% HNO3 w/ .5% HF	As needed
ICP/Calibration Standard and CCV	Env. Express/High Purity	1000ppm- Ca, K, Na 200ppm- Fe, Mg, Al 100ppm- S 40ppm- Si 20ppm-, As, B, Cu, Ni, Se, , Tl, , Mn,Ti, Li, V, Sr, Cr, Co, Zn 10ppm- Ag, Ba, Sb, Cd, Sn, Pb 5ppm- Mo 4ppm Be	Room temp.	5% HNO3 w/ Tr HF	As needed
ICP/LCS water/soil	Inorganic Ventures	1000ppm – Ca, Mg, K, Na 100ppm – all others except Li (spiked separately)	Room temp.	5% HNO3 w/Tr HF	As needed
ICP/LCS soil (only for IH)	ERA	Varies with Lot #	Room temp.	none	As needed
ICP/ICSA	Env. Express	5000ppm – Al, Ca, Mg, 2000ppm – Fe	Room temp.	10% HNO3	As needed
ICP/ICSB	Env. Express	100ppm – B, Cd, Pb, Ag, Ni, Si, Zn, 50ppm – all others except Sr, Li	Room temp.	4% HNO3 w/ Tr HF	As needed
ICP/Yttrium	Env. Express	10,000 ppm	Room temp.	4% HNO3	As needed
ICP/Indium	Env. Express	10,000ppm	Room temp.	2%HNO3	As needed
ICPMS/ICV	Inorganic Ventures	1000ppm-Ca, Mg, K, Na, Al, Fe 10ppm- all others	Room temp.	5% HNO3 w/ Tr HF	As needed

Table 8.3A: Stock Standard sources, receipt, and preparation information.
(subject to revision as needed)

STOCK STANDARD SOURCES
ICP metals used – Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn, S
ICP/MS metals used – Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn, B, U, Th, Na, Ca, Mg, K, Al, Ti, Sr

Instrument Group/Standard	*Standard Source**	*How Received**	*Source/ Storage*	*Lab Stock Storage*	*Receipt Frequency*
ICPMS/ Calibration Standard and CCV	Env. Express	100 ppm- Al, Fe 1000ppm-Mg, K, Ca, , Na 10ppm- All others	Room temp.	2% HNO3 w/ Tr HF	As needed
ICPMS/LCS water/soil	Inorganic Ventures	1000ppm – Ca, Mg, K, Na, Al, Fe 10ppm – all others	Room temp.	5% HNO3	As needed
ICPMS/LCS soil (for IH only)	ERA	Varies with Lot #	Room temp.	none	As needed
ICPMS/ICSA	Inorganic Ventures	10000ppm – Cl 2000ppm – C 1000ppm – Al, Ca, Fe, Mg, P, K, Na, S 20ppm – Mo, Ti	Room temp.	1.4% HNO3	As needed
ICPMS/ICSB	Inorganic Ventures	2ppm – Sb, As, Be, Cd, Cr, Co, Cu, Pb, Ni, Se, Ag, Tl, Sn, Zn, B, Ba, Cr, Mn, Sr, Th, V, U	Room temp.	5%HNO3 w/ Tr HF	As needed
Hg/ICV and LCS	Inorganic Ventures	1000ppm – Hg	Room temp.	2% HNO3	As needed
Hg/Calibration Standard and CCV	Env. Express	1000ppm – Hg	Room temp.	2% HNO3	As needed

**Equivalent Providers may be utilized.*

Table 8.3B: Working standard concentration, storage and preparation information.
(subject to revision as needed)

WORKING STANDARD PREPARATION
ICP metals used – Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn, S
ICP/MS metals used – Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn, B, U, Th, Na, Ca, Mg, K, Al, Ti, Sr

Instrument Group/Standard	*How Prepared*	*Final Concentration*	*Source/ Storage*	*Expiration*
ICP/ICV	2mL Custom Stock ICV A and B, adjusted to 100mL with 10% HNO3	10ppm – Al, Ca, Fe, K, Mg, Na 1ppm – All others	Room temp.	1 month
ICP/Calibration Standard	12.5mL Stock Cal. Std. 5mL Stock Cal. Std. 1mL Stock Cal. Std. 5mL Stock LL Std.All adjusted to 100 mL with 10%HNO3	Std 4 – 0.05/1.25/2.5/3.75/5/7.5/12.5/25/125ppm Std 3 0.2/.5/1/1.5/2/3/5/10/50ppm Std 2 – .04/.1/.2/.3/.4/.6/2/10ppm Std 1 – 0.002/.005/.01/.015/.02/.03/.01/.5/1ppm	Room temp.	1 month

Table 8.3B: Working standard concentration, storage and preparation information.
(subject to revision as needed)

WORKING STANDARD PREPARATION
ICP metals used – Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn, S
ICP/MS metals used – Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn, B, U, Th, Na, Ca, Mg, K, Al, Ti, Sr

Instrument Group/Standard	*How Prepared*	*Final Concentration*	*Source/ Storage*	*Expiration*
ICP/CCV	50mL Custom Stock CCV adjusted to 1000mL with 10% HNO_3	50ppm- Ca, K, Na 10ppm- Fe, Mg, Al 5ppm- S 2ppm-, Si, 1ppm- Cr, Co, Mn, , Sr, Ti, V, As, B, Cu, Li, Ni, Se, Tl, Zn 0.5ppm- Sn, Ag, Pb, Cd, Ba, Sb 0.2ppm Be, Mo	Room temp.	1 month
ICP/ICSA	100mL Custom Stock ICSA adjusted to 1000mL with10% HNO_3	500ppm – Al, Ca, Mg, 200ppm – Fe	Room temp.	1 month
ICP/ICSAB	100mL Custom Stock ICSA, 10mL Stock ICSAB adjusted to 1000mL with 10% HNO_3	500ppm – Al, Ca, Mg, 200ppm – Fe 1ppm – B, Cd, Pb, Ag, Ni, Si, Zn, 0.5ppm – all others except Sr, Li, S, K, Na	Room temp.	1 month
ICP/Yttrium	5mL Stock Yttrium adjusted to 10L with 10% HNO_3	5 ppm	Room temp.	1 month
ICP/Indium	3mL stock Indium adjusted to 1L with 10% HNO_3	30ppm	Room temp.	1 month
ICPMS/ICV	0.5mL Stock ICV A and B, adjusted to 50mL with 2% HNO_3/0.5%HCl	10ppm Ca, Mg, K, Na, Fe, Al 0.1ppm for all other elements	Room temp.	1 month
ICPMS/ Calibration Standard	1mL Stock Cal Std adjusted to 50mL with 2%HNO_3/0.5%HCl. Serial Dilutions are done each calibration from 0.2ppm Std.	Cal 6 – 20ppm, 2ppm, 0.2ppm Cal 5 – 10ppm, 1ppm, 0.1ppm Cal 4 – 5ppm, 0.5ppm, 0.05ppm Cal 3 – 1ppm, 0.1ppm, 0.01ppm Cal 2 – 0.2ppm, 0.02ppm, 0.002ppm Cal 1 – 0.1ppm, 0.01ppm, 0.001ppm	Room temp.	1 month
ICPMS/CCV	0.5mL Stock CCV adjusted to 50mL with 2% HNO_3/0.5%HCl.	10ppm- Ca, Mg, Na, K 1ppm-Fe, Al 0.1ppm- all other elements	Room temp.	1 month
ICPMS/ICSA	5mL Stock ICSA adjusted to 50mL with 2% HNO_3/0.5%HCl.	1000ppm – Cl 200ppm – C 100ppm – Al, Ca, Fe, Mg, P, K, Na, S 2ppm – Mo, Ti	Room temp.	1 month
ICPMS/ICSAB	5mL Stock ICSA, .5mL StockA and B ICSAB adjusted to 50mL with 2% HNO_3/0.5%HCl	1000ppm – Cl 200ppm – C 100ppm – Al, Ca, Fe, Mg, P, K, Na, S 2ppm – Mo, Ti 0.02ppm – all other elements	Room temp.	1Month
Hg/ICV	90µL of 1ppm Intermediate	0.003ppm – Hg	Room temp.	1Month

Table 8.3B: Working standard concentration, storage and preparation information.
(subject to revision as needed)

WORKING STANDARD PREPARATION
ICP metals used – Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, V, Zn, S
ICP/MS metals used – Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn, B, U, Th, Na, Ca, Mg, K, Al, Ti, Sr

Instrument Group/Standard	*How Prepared*	*Final Concentration*	*Source/ Storage*	*Expiration*
Hg/Calibration Standard	Soils and waters: Std 6 - 300µL of 1ppm Intermediate Std 5 - 150µL of 1ppmIntermediate Std 4 - 60µL of 1ppm Intermediate Std 3 -30µL of 1ppm Intermediate Std 2 - 12µL of 1ppm Intermediate Std 1 - 6µL of 1ppmIntermediate	Std 6 – 0.01ppm Std 5 – 0.005ppm Std 4 – 0.002ppm Std 3 – 0.001ppm Std 2 – 0.0004ppm Std 1 – 0.0002ppm	Room temp.	4 days
Hg/CCV	2.5ppb CCV - 75µL of 1ppm Intermediate	0.0025ppm	Room temp.	1 Month
Hg/LCS Waters	90µL of 1ppm Intermediate	0.003ppm – Hg	Room temp.	1 Month
Hg/LCS Soils	90uL of 1ppm Intermediate	0.003ppm- Hg	Room temp.	1 Month

8.4 INSTRUMENT CALIBRATION

Mercury Analyzer - SOP Numbers 340384A & 340384B

Calibration of the mercury analyzer is achieved using 5 standards. Acceptable calibration is achieved when the correlation coefficient $\geq$0.995. All results are calculated using software based on the peak area of the sample. A second source ICV is analyzed initially and must recover within $\pm$10% for Methods 7470A/7471A/7471B and within $\pm$5% for method 245.1. A primary source CCV is analyzed after every tenth sample and at the conclusion of the analytical sequence. The CCV must recovery within $\pm$10% for all analyses. Spike analyses are performed on 5% of the samples analyzed using EPA Method 7470A/7471A/7471B and on 10% of the samples analyzed using EPA Method 245.1.

Inductively Coupled Plasma (ICP and ICPMS) - SOP Numbers 340386 & 340390

, Thermo 7400 ICP and Agilent ICPMS 7700, 7900 and calibrated using at least 3 standards. A new calibration curve is analyzed daily. All calculations are performed by software using computerized linear regression. The linear regression correlation coefficient for the each analyte in the calibration curve lines must be 0.995 or better for all methods, except for EPA 6010C and 6020A which must have a correlation coefficient of 0.998 or better, A second source ICV is run initially and a primary source CCV is run after every tenth sample. For method 200.7, the ICV must recover within 5% of the true value and for all other methods, the ICV must recover within 10% for methods 6010B/C/D, 6020, 6020A/B, and 200.8. The CCV for all methods must recover within 10% of the true value. Duplicate and spike analyses are performed on 5% of the samples for EPA Methods 6010B, 6010C, 6010D, 6020, 6020A, 6020B and on 10% of the samples analyzed using EPA Methods 200.7 & 200.8.

TABLE 8.4: CALIBRATION STANDARD CONCENTRATIONS ***This table is subject to revision without notice***			
Analyte	**ICP (mg/L)**	**ICP/MS (mg/L)**	**CVAA (ug/L)**
Aluminum	0.20 - 500	0.01 - 2.0	
Antimony	0.01 – 5.0	0.001 - 0.2	
Arsenic	0.01 – 5.0	0.001 - 0.2	
Barium	0.005 - 10	0.001 - 0.2	
Beryllium	0.002 – 2.0	0.001 - 0.2	
Boron	0.05 – 5.0	0.001 - 0.2	
Cadmium	0.002 – 2.0	0.001 - 0.2	
Calcium	0.5 - 500	1.0 - 20.0	
Chromium	0.01 – 2.5	0.001 - 0.2	
Cobalt	0.01 – 2.5	0.001 - 0.2	
Copper	0.01 – 5.0	0.001 - 0.2	
Iron	0.10- 200	0.01 - 2.0	
Lead	0.005 – 2.0	0.001 - 0.2	
Lithium	0.015 – 3.75	----------	
Magnesium	0.5 - 500	1.0 - 20.0	
Manganese	0.010 – 2.5	0.001 - 0.2	
Molybdenum	0.005 – 2.0	0.001 - 0.2	
Nickel	0.01 – 5.0	0.001 - 0.2	
Potassium	0.50 - 100	1.0 - 20.0	
Selenium	0.01 – 5.0	0.001 - 0.2	
Silicon	0.05 – 5.0	----------	
Silver	0.005 – 2.5	0.001 - 0.2	
Sodium	0.50 - 500	1.0 - 20.0	
Strontium	0.01 – 2.5	0.001 - 0.2	
Sulfur	0.5 - 100	----------	
Thallium	0.01 – 5.0	0.001 - 0.2	
Thorium	----------	0.001 - 0.2	
Tin	0.05 – 5.0	0.001 - 0.2	
Titanium	0.05 – 2.5	0.001 - 0.2	
Uranium	----------	0.001 - 0.2	
Vanadium	0.02 – 2.5	0.001 - 0.2	
Zinc	0.05 – 7.5	0.001 - 0.2	
Mercury			Blank, 0.0002 - 0.010

8.5 ACCEPTANCE/REJECTION OF CALIBRATION

The initial calibration curve is compared with previous curves for the same analyte. All new standard curves are immediately checked with a secondary source or laboratory control standard prepared from a separate source than those used for calibration. All curves are visually reviewed to ensure that acceptable correlation represents linearity. Calibration curves may be rejected for nonlinearity, abnormal sensitivity, or poor response of the laboratory control standard. Specific criteria for each instrument are outlined in Table 8.5.

Continuing calibration verification is performed after every tenth sample. If a check standard does not perform within established criteria then the instrument is evaluated to determine the problem. Once the problem is corrected, all samples between the last in control sample and the first out of control check are re-analyzed.

TABLE 8.5 INSTRUMENT CALIBRATION & QC

Instrument (Analysis)	Calibration Type	Number of Standards	Acceptance/ Rejection Criteria	Frequency
ICP & ICPMS	Linear/ Initial	3 - 5	6010B, 6020, 200.7 200.8: Must have a correlation coefficient of at least 0.995. 6010C/D, 6020A/B: Must have a correlation coefficient of at least 0.998	Daily
ICP & ICPMS	Initial	Secondary source (ICV)	6010B, 6010C/D, 6020, 6020A/B, 200.8: ICV must be within +/-10%; 200.7: ICV must be within +/-5%	After initial calibration
ICP & ICPMS	Initial	1 Initial Calibration Blank	< ½ RL, concentrations of common laboratory contaminants shall not exceed the RL	After initial calibration
ICP, ICPMS, Mercury	Continuing	1 mid-level ref. std. (CCV)	Must be within ±10%	Every 10th sample
ICP & ICPMS, Mercury	Continuing	1 Continuing Calibration Blank	< RL, concentrations of common laboratory contaminants must not exceed the RL	Every 10th sample
ICP & ICPMS	Continuing	1 ICSA 1 ICSAB	Must be within ±20% for ICP and ICPMS	After initial calibration, at end and every 8 hours of run time.
ICP, ICPMS, Mercury	Continuing	1 Method Blank	< RL (<1/2 RL for DOD).	1 per batch
ICP, ICPMS, Mercury	Continuing	1 Laboratory Control Standard	200.8, 200.7, 245.1: LCS must be within 15%. 6010B, 6010C/D,6020, 6020A/B,7470A, 7471A/B must be within 20%	1 per batch
ICP & ICPMS	Continuing	1 Matrix Spike (MS), 1 Matrix Spike Duplicate (MSD)	6010B, 6010C/D, 6020, 6020A/B: Spike must be within ±25%, 200.8, 200.7 must be within 30%. MS and MSD must have an RPD ≤20%	1 of each per batch

TABLE 8.5 INSTRUMENT CALIBRATION & QC				
Instrument (Analysis)	**Calibration Type**	**Number of Standards**	**Acceptance/ Rejection Criteria**	**Frequency**
Mercury	Linear/ Initial	3 - 5	Must have a correlation coefficient of at least 0.995	Daily
Mercury	Initial	Secondary source (ICV)	7470A, 7471: ICV must be within ±10% 245.1: ICV must be within ±5%	After initial calibration
Mercury	Continuing	1 Matrix Spike (MS), 1 Matrix Spike Duplicate (MSD)	7470A, 7471A/B: Spike must be within ±25%, 245.1 must be within 30%. MS and MSD must have an RPD ≤20%	1 of each per batch

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent grade water is obtained from an ELGA Purelab Ultra system.

9.2 GLASSWARE WASHING AND STERILIZATION PROCEDURES

Much of the glassware used in metals preparation is disposable; however non-disposable glassware involved in metals preparation is washed with soap and water, rinsed in 1+1 nitric acid, and rinsed in DI water. Through digestion blanks, it has been determined that chromic acid washing is unnecessary. Glassware with visible gummy deposits remaining after washing is disposed of properly. All metals glassware is given another DI water rinse immediately prior to use. Metals glassware is segregated from all other glassware.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the metals laboratory can be found in the following table.

TABLE 10.1: METALS DEPARTMENT SOPS

This table is subject to revision without notice

SOP #	Title
TCLP SOPs	
340358	TCLP
340704	SPLP
340363	EP TOX
340364	MEP
340705	California Waste Extraction Test
Mercury SOPs	
340384A	Mercury in Liquid Waste (Cold-Vapor Technique) 7470A/245.1
340384B	Mercury in Solid Waste (Cold-Vapor Technique) 7471A
Metals Prep SOPs	
340389	Acid Digestion of Aqueous Samples and Extracts Method 3005A/3010A/3015/3030C
340380	Digestion of Metals and Trace Elements in DW and Wastes Method 200.2
340388	Acid Digestion of Sediments, Sludge, Soils and Oils Method 3050B/3051

SOP #	Title
340354A	Turbidity-Metals Drinking Water Screen Only (EPA Method 180.1)
340392	Sodium Absorption Ratio
Metals Analysis SOPs	
340386	Metals by ICP Method 6010, 200.7
340390	Metals by ICP-MS Method 6020, 200.8

11.0 QUALITY CONTROL CHECKS

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

11.1 ESC participates in proficiency testing (PTs) in support of various laboratory accreditations/recognitions. Environmental samples are purchased from Phenova. The WS, WP and solid matrix studies are completed every 6 months. All proficiency testing samples are received and analyzed by method according to the vendor's instructions and according to the applicable analytical SOP.

11.2 Initial Demonstrations of Capability (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing Demonstration of Capability (CDOCs) must be updated at least annually. The associated data is filed within the department and available for review.

11.3 Matrix Spike and Matrix Spike Duplicates are performed on 5–10% of samples analyzed depending on analytical method requested. For methods 6010, 6020, 7470A and 7471A duplicates, matrix spikes and matrix spike duplicates are performed on 5% of samples. For methods 200.7, 200.8 and 245.1, the same QC is performed on 10% of samples. The RPD must not exceed 20%.

11.4 A laboratory control sample (LCS) is analyzed one per batch of samples. The acceptance criteria for all water samples is ±15% for 245.1, 200.7, and 200.8. All other methods have an acceptance criteria of ±20%.

11.5 A method preparation blank is performed per batch of samples processed. If the reporting limit [RL] is exceeded, the laboratory evaluates whether reprocessing of the samples is necessary, based on the following criteria:

- The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparation batch or
- The blank contamination is greater than 1/10 of the specified regulatory limit.

The concentrations of common laboratory contaminants must not exceed the reporting limit. Any samples associated with a blank that fail these criteria are re-processed in a subsequent preparation batch, except when the sample analysis resulted in non-detected results for the failing analytes.

12.0 DATA REDUCTION, VALIDATION, AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in ESC SOP #030201, *Data Handling and Reporting.* A secondary review of the data package is performed according to ESC SOP #030227, *Data Review*. The reviewer verifies that the analysis has been performed as required and meets method criteria, all associate data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required flags on test reports, etc.)

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.1 for current QC targets and controls and current reporting limits.

12.3 REPORTING

Reporting procedures are documented in SOP #030201, *Data Handling and Reporting.*

Table 12.3: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs
(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppm)
(ICP-AES)	Aluminum	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.20
(ICP-AES)	Aluminum	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.20
(ICP-AES)	Aluminum	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	10
(ICP-MS)	Aluminum	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.10
(ICP-MS)	Aluminum	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.1
(ICP-MS)	Aluminum	3050B/3051A	6020/A/B	Solid	80 - 120	<20	10
(ICP-AES)	Antimony	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-AES)	Antimony	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-AES)	Antimony	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	2.0
(ICP-MS)	Antimony	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Antimony	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Antimony	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10
(ICP-AES)	Arsenic	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-AES)	Arsenic	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-AES)	Arsenic	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	2.0
(ICP-MS)	Arsenic	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001

Table 12.3: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppm)
(ICP-MS)	Arsenic	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Arsenic	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10
(ICP-AES)	Barium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.005
(ICP-AES)	Barium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.005
(ICP-AES)	Barium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	0.50
(ICP-MS)	Barium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.002
(ICP-MS)	Barium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.005
(ICP-MS)	Barium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.20
(ICP-AES)	Beryllium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.002
(ICP-AES)	Beryllium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-AES)	Beryllium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	0.20
(ICP-MS)	Beryllium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Beryllium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Beryllium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10
(ICP-AES)	Boron	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.20
(ICP-AES)	Boron	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.20
(ICP-AES)	Boron	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	10
(ICP-MS)	Boron	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.02
(ICP-MS)	Boron	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.02
(ICP-MS)	Boron	3050B/3051A	6020/A/B	Solid	80 - 120	<20	1.0
(ICP-AES)	Cadmium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.002
(ICP-AES)	Cadmium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-AES)	Cadmium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	0.50
(ICP-MS)	Cadmium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Cadmium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.001
(ICP-MS)	Cadmium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10
(ICP-AES)	Calcium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	1.0
(ICP-AES)	Calcium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	1.0
(ICP-AES)	Calcium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	100
(ICP-MS)	Calcium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1.0
(ICP-MS)	Calcium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	1.0
(ICP-MS)	Calcium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	50
(ICP-AES)	Chromium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-AES)	Chromium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-AES)	Chromium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	1.0
(ICP-MS)	Chromium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Chromium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Chromium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10

Table 12.3: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppm)
(ICP-AES)	Cobalt	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-AES)	Cobalt	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-AES)	Cobalt	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	1.0
(ICP-MS)	Cobalt	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Cobalt	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Cobalt	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10
(ICP-AES)	Copper	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-AES)	Copper	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-AES)	Copper	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	2.0
(ICP-MS)	Copper	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.002
(ICP-MS)	Copper	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.005
(ICP-MS)	Copper	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.20
(ICP-AES)	Iron	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.10
(ICP-AES)	Iron	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.10
(ICP-AES)	Iron	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	10
(ICP-MS)	Iron	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.10
(ICP-MS)	Iron	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.10
(ICP-MS)	Iron	3050B/3051A	6020/A/B	Solid	80 - 120	<20	250
(ICP-AES)	Lead	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.005
(ICP-AES)	Lead	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.005
(ICP-AES)	Lead	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	0.50
(ICP-MS)	Lead	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Lead	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Lead	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10
(ICP-AES)	Lithium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.015
(ICP-AES)	Lithium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.015
(ICP-AES)	Lithium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	5.0
(ICP-AES)	Magnesium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	1.0
(ICP-AES)	Magnesium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	1.0
(ICP-AES)	Magnesium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	100
(ICP-MS)	Magnesium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1.0
(ICP-MS)	Magnesium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	1.0
(ICP-MS)	Magnesium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	50
(ICP-AES)	Manganese	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-AES)	Manganese	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-AES)	Manganese	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	1.0
(ICP-MS)	Manganese	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.002
(ICP-MS)	Manganese	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.005

Table 12.3: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppm)
(ICP-MS)	Manganese	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.20
(CVAA)	Mercury	7471A/B	7471A/B	Solid	80 - 120	<20	0.02
(CVAA)	Mercury	7470A	7470A	Liquid/Aqueous	80 - 120	<20	0.0002
(CVAA)	Mercury	245.1 /7470A	245.1	Liquid/Aqueous	85 - 115	<20	0.0002
(ICP-AES)	Molybdenum	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.005
(ICP-AES)	Molybdenum	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.005
(ICP-AES)	Molybdenum	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	0.50
(ICP-MS)	Molybdenum	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.002
(ICP-MS)	Molybdenum	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.005
(ICP-MS)	Molybdenum	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.20
(ICP-AES)	Nickel	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-AES)	Nickel	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-AES)	Nickel	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	2.0
(ICP-MS)	Nickel	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Nickel	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Nickel	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10
(ICP-AES)	Potassium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	1.0
(ICP-AES)	Potassium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	1.0
(ICP-AES)	Potassium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	100
(ICP-MS)	Potassium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1.0
(ICP-MS)	Potassium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	1.0
(ICP-MS)	Potassium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	50
(ICP-AES)	Selenium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-AES)	Selenium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-AES)	Selenium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	2.0
(ICP-MS)	Selenium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Selenium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Selenium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10
(ICP-AES)	Silicon	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.20
(ICP-AES)	Silicon	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.20
(ICP-AES)	Silicon	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	20
(ICP-AES)	Silver	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.005
(ICP-AES)	Silver	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.005
(ICP-AES)	Silver	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	1.0
(ICP-MS)	Silver	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Silver	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Silver	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.20
(ICP-AES)	Sodium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	1.0

Table 12.3: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs

(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppm)
(ICP-AES)	Sodium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	1.0
(ICP-AES)	Sodium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	100
(ICP-MS)	Sodium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	1.0
(ICP-MS)	Sodium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	1.0
(ICP-MS)	Sodium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	50
(ICP-AES)	Strontium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-AES)	Strontium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-AES)	Strontium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	1.0
(ICP-MS)	Strontium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-MS)	Strontium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-MS)	Strontium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.50
(ICP-AES)	Sulfur	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	1.0
(ICP-AES)	Sulfur	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	1.0
(ICP-AES)	Sulfur	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	100
(ICP-AES)	Thallium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-AES)	Thallium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-AES)	Thallium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	2.0
(ICP-MS)	Thallium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Thallium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Thallium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10
(ICP-MS)	Thorium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-MS)	Thorium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-MS)	Thorium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	1
(ICP-AES)	Tin	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.05
(ICP-AES)	Tin	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.05
(ICP-AES)	Tin	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	5.0
(ICP-MS)	Tin	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.001
(ICP-MS)	Tin	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.002
(ICP-MS)	Tin	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.10
(ICP-AES)	Titanium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.05
(ICP-AES)	Titanium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.05
(ICP-AES)	Titanium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	5.0
(ICP-MS)	Titanium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-MS)	Titanium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-MS)	Titanium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.50
(ICP-AES)	Vanadium	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.02
(ICP-AES)	Vanadium	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.02
(ICP-AES)	Vanadium	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	2.0

Table 12.3: QC Targets for Environmental Metals Accuracy (LCS), Precision and RLs
(subject to revision without notice)

Class	Analyte	Prep Method	Analysis Method	Matrix	Accuracy Range (%)	Precision (RPD)	RL (ppm)
(ICP-MS)	Vanadium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.002
(ICP-MS)	Vanadium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.005
(ICP-MS)	Vanadium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	0.20
(ICP-MS)	Uranium	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-MS)	Uranium	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.01
(ICP-MS)	Uranium	3050B/3051A	6020/A/B	Solid	80 - 120	<20	1
(ICP-AES)	Zinc	200.2 NPDES	200.7	Liquid/Aqueous	85 - 115	<20	0.05
(ICP-AES)	Zinc	3015/3010	6010B/C/D	Liquid/Aqueous	80 - 120	<20	0.05
(ICP-AES)	Zinc	3050B/3051A	6010B/C/D	Solid	80 - 120	<20	5.0
(ICP-MS)	Zinc	200.2 NPDES	200.8	Liquid/Aqueous	85 - 115	<20	0.01
(ICP-MS)	Zinc	3015/3010	6020/A/B	Liquid/Aqueous	80 - 120	<20	0.025
(ICP-MS)	Zinc	3050B/3051A	6020/A/B	Solid	80 - 120	<20	1.0

13.0 CORRECTIVE ACTIONS

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CARs are kept on file by the Regulatory Affairs Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these control limits are exceeded, corrective action must be taken. Calculated sample spike control limits are also used.

All samples and procedures are governed by ESC's quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory, the method criteria takes precedence.

13.2.2 Calibration Verification Criteria Are Not Met: Inorganic Analysis

Rejection Criteria - See Table 8.5.

Corrective Action - If a standard curve linearity is not acceptable and/or the absorbance for specific standard(s) is not analogous to historic data, the instrument settings, nebulizer, etc. are examined to ensure that nothing has been altered, clogged, etc. The working standards are made fresh, intermediate dilutions are re-checked and the instrument is re-calibrated. If a problem persists, the Department Supervisor is notified for further action.

If the initial reference check sample is out of control, the instrument is re-calibrated and the check sample is rerun. If the problem continues the check sample is re-prepared. If the problem still exists then the standards and reagent blank are re-prepared. If the problem persists, the Department Supervisor is notified for further action.

13.2.3 Out Of Control Blanks: Applies to Method, Trip, Rinsate & Instrument Blanks

Rejection Criteria - Blank reading is more than the RL for Method Blanks and/or Instrument Blanks. (½ the RL for Method Blanks and/or instrument blanks for DoD work and also may be required for some customers and programs.)

Corrective Action - Standard curves and samples are evaluated for any obvious contamination that may be isolated or uniform throughout the sequence. If necessary, reagents, QC samples and field samples are re-prepared and re-analyzed. Re-analyses are not initiated until the cause of the contamination is identified and resolved. If samples have already been partially prepared or analyzed, the Department Supervisor is consulted to determine if data needs to be rejected or if samples need to be re-prepped.

13.2.4 Out Of Control Laboratory Control Standards (LCS)

Rejection Criteria - If the performance is outside of lab-generated control (Listed in Table 12.3).

Corrective Action - Instrument settings are checked. The LCS standard is re-analyzed. If the LCS is still out of control, re-calibration is performed, and samples affected since the last in control reference standard are re-analyzed. If the LCS fails again after re-calibration, the entire workgroup must be re-prepped. The Department Supervisor is consulted for further action.

13.2.5 Out Of Control Matrix Spike Samples

Rejection Criteria - If either the MS or MSD sample is outside the established control limits.

Corrective Action - Any compound that is outside of these limits is considered to be 'out of control' and must be qualified appropriately. Batch acceptance, however, is based on method blank and LCS performance, not on MS/MSD recoveries. Specific methods, customers, and programs may require further corrective action in some cases.

13.2.8 Out Of Control Calibration Standards: ICV, CCV, SSCV

”

Rejection Criteria - If the performance is outside of method requirements.

Corrective Action - Instrument settings are checked, calibration verification standard is rerun. If the standard is still out of control, re-calibration is performed, and samples affected since the last in control reference standard are rerun. The Department Supervisor is consulted for further action.

13.3 Responsibility - It is the Department Supervisor's responsibility to evaluate the validity of the corrective action response and submit it to the QA department for processing. In addition, the Supervisor is responsible for appointing the appropriate person within the department to be responsible for correcting the nonconformance. When a corrective action warrants a cessation of analysis, the following personnel are responsible for executing the "stop work order:

- Laboratory Manager
- QA Department
- Department Supervisor
- Technical Service Representative

14.0 RECORD KEEPING

Record keeping is outlined in SOP #030230, *Standards Logger, SOP #030227, Data Review* and SOP #030201, *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 12.0 and *SOP #010104, Internal Audits.*

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16.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix V)	General – Replaced the term "client with the term "customer Section 7.1 – Revised to state all soils are stored <6°C not just soils for Hg Section 8.0 – Updated Software Table 8.1 – Updated Equipment List Tables 8.3A and 8.3B – Updated Standards Table 8.4 – Updated range of calibration standards Table 10.1 – Updated SOP List Section 11.1 – Removed AIHA PTs Section 11.4 – Removed AIHA LCS Section 12.3 – Removed AIHA QC Table Table 12.3 – Updated RLs and added Thorium by ICP/MS

1.0 SIGNATORY APPROVALS

VOLATILES QUALITY ASSURANCE MANUAL

APPENDIX VI TO THE ESC QUALITY ASSURANCE MANUAL

for

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NOTE: The QAM has been approved by the following people.

7/13
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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure analytical data generated from the Volatiles (VOC) laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the customer with both routine and specialized services, field sampling guidance and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Heidi Ferrell, with a B.S. degree in Chemistry, is the Department Supervisor and is responsible for the overall production of the department; including the management of the staff and scheduling. Ms. Ferrell has 10 years of environmental laboratory experience. In her absence, Brett Andersen assumes responsibility for departmental decisions in the Volatiles Lab.

Brett Andersen, with a B.S in Microbiology and M.S. in Plant Microbiology and Pathology, is the Primary Analyst for the Volatiles Lab. He is proficient in volatile organic analytical methods and has 10 years of environmental laboratory experience.

5.2 TRAINING

5.2.1 All new analysts to the laboratory are trained by a Primary Analyst or Supervisor according to ESC protocol. ESC's training program is outlined in *SOP 030205 Technical Training and Personnel Qualifications.* Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in VOC Laboratory is also demonstrated by acceptable participation in the Phenova proficiency testing program (PTs) and using daily Quality Control sample analyses. Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the instrumentation laboratory in Building #2 has approximately 7000 square feet with 700 square feet of bench area and 300 square feet of preparatory area. The lighting standard is fluorescence. The air handling systems are (1) 60-ton units with gas heating and (1) 25-ton unit. The physical and air-handling separations, between this laboratory and other ESC sections, prevent potential cross-contamination between solvent vapor generation and incompatible analytical processes. Waste disposal containers are located in the laboratory and Clean Harbors serves as ESC's waste disposal carrier. Waste handling is discussed in detail in Section 6.0 of the ESC Quality Assurance Manual. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods.

ESC's laboratory safety guidelines are detailed in the *ESC Chemical Hygiene Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedures are described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Matrices for VOC environmental analyses include groundwater, wastewater, drinking water, soil, and sludge.
- Sample containers, preservation methods and holding times vary depending on analyses requested. Please see determinative procedures for specific directions.
- Plastic containers or lids may NOT be used for the storage of samples due to sample contamination from the phthalate esters and other hydrocarbons in the plastic.
- Environmental sample containers should be filled carefully to prevent any portion of the sample from coming into contact with the sampler's gloves causing possible contamination.
- Containers for VOC samples should be selected carefully to minimize headspace that could lead to a low bias in the analytical results. Headspace is monitored during sample login and is documented on the Sample Receipt Corrective Action form when observed.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

TABLE 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	1	3333A31215	Volatiles
Gas Chromatograph	Agilent	6890	VOCGC	2	CN10609095	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	3	2950A26786	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	4	3336A50614	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	5	3027A29678	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	6	2950A27895	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	7	3313A37610	Volatiles
Gas Chromatograph	Hewlett Packard	5890 Series II	VOCGC	13	2921A23548	Volatiles
Gas Chromatograph	Agilent	6890	VOCGC	10	US00022519	Volatiles
Gas Chromatograph	Agilent	6890	VOCGC	12	US00000410	Volatiles
Gas Chromatograph	Agilent	6890	VOCGC	14	CN10408054	Volatiles
Gas Chromatograph	Agilent	6890	VOCGC	15	US10232130	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5975 MSD	VOCMS	2	GCCN10641044 MSUS63234371	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973 MSD	VOCMS	6	GCCN10343037 MSUS44647141	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	4	GCUS00003465 MSUS82311257	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	7	GCUS00040221 MS05040022	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	8	GCUS00040221 MS03940725	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	13	GCCN103390006 MSUS91911078	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	14	GCUS00009794 MSUS63810153	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	16	GCUS00006479 MSUS82321899	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	18	GC CN10517046 MSUS03340424	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	19	GCCN10611062 MSUS60542638	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5975MSD	VOCMS	20	GCCN621S4367 MSUS469A4832	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5975MSD	VOCMS	21	GCCN621S4368 MSUS469A4833	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	22	GCCN10728074 MSUS71236615	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5975MSD	VOCMS	23	GCCN10728068 MSUS71236616	Volatiles

TABLE 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	24	GCCN10151020 MSUS10223406	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	25	GCCN99205324 MSUS98003634	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	26	GCCN10301152 MSUS10313616	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	27	GCCN10301155 MSUS10313619	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	28	GCUS000034135 MSUS94240103	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	29	GCUS00033898 MSUS94240096	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC/ 5973MSD	VOCMS	30	GCUS10208101 MSUS10442360	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	31	GCUS14453011 MSUS54441572	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	32	GCCN13113015 MSUS92013978	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	33	GCCN11351165 MSUS52440724	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	34	GCCN13231014 MSUS50680012	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	35	GCCN10849077 MSUS83131017	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975 MSD	VOCMS	36	GCCN11281031 MSUS50680017	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5977MSD	VOCMS	37	GCCN15333012 MSUS1534M407	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	38	GCCN11281031 MSUS83141150	Volatiles
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC/ 5975MSD	VOCMS	39	GCCN10940090 MSUS92043681	Volatiles
Centurion Autosampler	(14) PTS/EST	Centurion				Volatiles
Autosampler	(24) Varian	Archon				Volatiles
Autosampler	(2) CDS	7400				Volatiles
Autosampler	(1) OI Analytical	4100				Volatiles
Purge and Trap	(18) OI Analytical	Eclipse				Volatiles
Purge and Trap	(15) PTS/EST	Encon				Volatiles
Purge and Trap	(7)PTS/EST	Evolution				Volatiles

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

INSTRUMENT	P. M. DESCRIPTION	FREQUENCY
Analytical Balances	•Check with Class "I" weights	Daily; tolerance ±0.1%
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semiannually

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION		
INSTRUMENT	P. M. DESCRIPTION	FREQUENCY
Refrigerators & Incubators	•Maintenance service	As needed - determined by daily temperature performance checks
Gas Chromatograph Detectors: FID	Change Quartz jet; clean; replace flame tip	As needed - when deterioration is noticeable
Gas Chromatograph Detectors: PID	Change or clean lamp	As needed - when deterioration is noticeable
Gas Chromatograph/Mass Spectrometer	•Autotune Report	Inspected daily
Gas Chromatograph/Mass Spectrometer	•Clean ion source	As needed to maintain high mass resolution
Gas Chromatograph/Mass Spectrometer & Gas Chromatographs	•Replace septum and liner	As needed to maintain injection port inert
Gas Chromatograph/Mass Spectrometer	•Replace vacuum pump oil	Every 6 months
Gas Chromatograph/Mass Spectrometer & Gas Chromatographs	•Replace column	When separation begins to degrade
Archon/ Centurion Autosampler	•Monitor the Daily QC, including internal standards for changes or failure.	Daily with use

8.3 STANDARDS AND REAGENTS

Table 8.3A: Standard stock sources, description and calibration information.
This table is subject to revision without notice

Method	Vendor*	Description	Calibration	Storage Req.	Expiration
8260	Ultra	Gases Mix	Primary	-30°C to 4°C	1 week
	Ultra	Custom Standard	Primary	2°C to 8°C	6 months
	NSI	Mix 2	Primary	2°C to 8°C	6 months
	Restek	Acrolein	Primary	<0°C	3 months
	SPEX	Custom (AZ analytes)	Primary	<0°C	6 months
	Restek	TX TPH Mix (GRO)	Primary	<10°C	6 months
	SPEX	Custom (AZ analytes)	Secondary	<0°C	6 months
	NSI	Custom VOC Mix 2	Secondary	2°C to 8°C	6 months
	Restek	Custom VOC Standard #1	Secondary	<0°C	6 months
	Restek	Custom VOCStandard #2	Secondary	<0°C	6 months
	Restek	Custom VOC Standard #3	Secondary	<0°C	6 months
	Restek	Custom VOC Standard #4	Secondary	<0°C	6 months
	Restek	Acrolein	Secondary	<0°C	3 months
	Ultra	Petroleum Products Solution (GRO)	Secondary	15°C to 30°C	6 months
8015 (GRO)	Restek	Certified BTEX in Unleaded Gas Composite Standard	Secondary	<0°C	6 months
	NSI	Gas Composite	Primary	2°C to 8°C	6 months
8021	Restek	WISC PVOC/GRO Mix	Secondary	<0°C	6 months
	NSI	PVOC/GRO Mix WI	Primary	4° ± 2°C	6 months
VPH	NSI	Primary VPH Dilution Std	Primary	15°C to 30°C	6 months
	NSI	Custom VPH LCS MIX	Secondary	4° ± 2°C	6 months

**Equivalent Providers may be utilized.*

TABLE 8.3B: Working Standard Concentrations *This table is subject to revision without notice*			
ORGANIC COMPOUNDS	**Method #**	**GC/MS**	**GC**
VOCs by GC/MS	524.2, 624, SM6200B 20th, 8260B	GW/WW , 0.5, 1, 2, 5, 10, 25, 40, 75, 100, 200µg/L DW 0.25, 0.5, 1, 2, 5, 10, 25, 50, 100, 150µg/L GRO 0.4, 1, 2, 4, 5, 7, 10, 20ug/mL	
BTEX/GRO, 8015MOD, WI GRO, LA TPH G, OHIO GRO, WI PVOC, BTEX/OA1	BTEX 8021 GRO 8015, BTEX OA1 or state specific GRO		BTEX 0.5, 1, 5,10, 25,50,100,150,200, 250ug/L (m,p-Xylene is doubled) GRO 0.055, 0.11, 0.55, 1.1. 2.75, 5.5, 11mg/L
MADEP VPH	MADEP VPH		Aromatic C9-C10: 0.001, 0.002, 0.01, 0.02, 0.05, 0.1, 0.2, 0.4, 1.0, 2.0mg/L Aliphatic C5-C8: 0.006, 0.012, 0.06, 0.12, 0.3, 0.6, 1.2, 2.4, 6.0, 12.0mg/L Aliphatic C9-C12: 0.007, 0.014, 0.07, 0.14, 0.36, 0.7, 1.4, 2.8, 7.0, 14.0mg/L

8.4 INSTRUMENT CALIBRATION

602 - BTEX - SOP Number 330351

The gas chromatograph is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of three concentration levels for each compound of interest. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors are <10 % RSD over the working range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990 (0.995 for USACE Projects). An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should recover within ±20% of the expected concentration for each analyte.

During the analytical sequence, the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of continuing calibration verification (CCV) standards. The CCV must recovery within 15% of the expected concentration for each analyte.

At daily instrument startup and in lieu of performing an entire initial calibration, the working calibration curve or response factors are verified on each working day by the analysis of a Quality Control Check Standard. The responses must meet the criteria found

in Table 2 of the 602 Method. If the responses do not meet these criteria, the analysis must be repeated. If the standard still does not meet the criteria, a new calibration curve is prepared.

8021B - BTEX - SOP Number 330351

The gas chromatograph is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of five concentration levels for each compound of interest.

The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors are <20 % RSD over the working range, the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios (Area/Ref. Area) vs (Amt./Ref Amt). If the response factors of the initial calibration are <20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990 (0.995 for USACE Projects). An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should recover within ±20% of the expected concentration for each analyte.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies from the predicted response by more than ±20%, the analysis must be repeated using fresh standard. If the standard still does not meet the acceptance criteria, a new initial calibration curve must be generated.

8015B/C/D & State Methods - Gasoline Range Organics - SOP Number 330351

Certain state accreditation/registration programs may have specific requirements for calibration and analysis that must be met. Those requirements supersede the general guidance provided in this section and are addressed in the relevant determinative SOP. For EPA Method 8015 for routine GRO analyses, the gas chromatograph is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of five concentration levels for each analyte of interest. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are <20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.)

for quantitation providing that the correlation coefficient is at least 0.990 (0.995 for USACE DOD Projects). An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should meet criteria of ±20% of the expected concentration for each analyte.
The working calibration curve or response factors are verified on each working day by the analysis of one or more calibration standards. If the response of any analyte varies from the predicted response by more than 20% RSD, the analysis must be repeated using a new calibration standard. If the standard still does not meet the criteria, a new calibration curve is prepared.

8260B/C, 624, SM6200B, 524.2 - Gas Chromatography/Mass Spectrometry (GC/MS): Volatile Organics - SOP Numbers 330363 & 330364

Detector mass calibration is performed daily using the autotune function of the GC/MS analytical system and BFB (Bromofluorobenzene). Following verification of the appropriate masses, the instrument sensitivity is verified by injecting a tuning solution containing bromofluorobenzene (BFB). The BFB spectra must meet the following ion abundance criteria:

Mass	Ion Abundance Criteria
50	15 to 40% of mass 95
75	30 to 60% of mass 95
95	base peak, 100% relative abundance
96	5 to 9% of mass 95
173	Less than 2% of mass 174
174	greater than 50% of mass 95
175	5 to 9% of mass 174
176	greater than 95% but less than 101% of mass 174
177	5 to 9% of mass 176

Successful tuning must occur every 12 hours for method 524.2, 8260B/C & SM6200B and every 24 hours for method 624.

Following successful tuning, the GC/MS is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of three standards for method 624, 524.2 and five standards for method 8260B/C and SM6200B. The calibration standards are tabulated according to peak height or area against concentration and the concentrations and responses of the internal standard analytes. The results are used to determine a response factor for each analyte in each standard injected. A calibration curve is constructed and is determined to be acceptable if each target analyte is found to be constant over the working range as defined as:

≤15% RSD for methods 8260B
≤20% RSD for method 524.2, 8260C, SM6200B
≤35% RSD for method 624

Per the analytical method, specific target analytes are defined as calibration check compounds (CCCs) or system performance check compounds (SPCCs). The calibration checks compounds (CCCs) for method 8260B must be ≤30% RSD. When these conditions are met, linearity through the origin can be assumed and the average RF can be used in place of a calibration curve.

Linear regression can be used for any target compound exceeding the RSD criteria but less than 40% (poor performers <50%), if the correlation coefficient is 0.990 or better. For USACE/DOD projects the correlation coefficient must meet 0.995 or better. The same is true for the CCCs in EPA 8260B as long as the RSD does not exceed 30%.

8260B SPCCs:	
Analyte	**Minimum Average Response Factor**
Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

8260B CCCs:	
1,1-Dicholoethene	Toluene
Chloroform	Ethylbenzene
1,2-Dichloropropane	Vinyl Chloride

The initial calibration range must represent the typical environmental sample and include the RL as the lowest calibration point. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range.

A second source calibration verification standard is analyzed after each calibration. The second source should recover within 30% for all CCC compounds and within 40% for other analytes of interest, with the exception of analytes known to perform poorly (i.e. low purging efficiency, etc.) that will meet historical LCS accuracy limits. For 524.2 the second source calibration verification standard must be within ± 30%. Following successful calibration, the analysis of field and QC samples may begin. Sample analysis may be performed only during the timeframe of a valid tuning cycle (12 hours for 8260B, 524.2 & SM6200B and 24 hours for 624). Following the expiration of the tuning clock, the instrument must be re-tuned and either recalibrated or the existing calibration must be re-verified.

For 8260B/C, 524.2 & SM6200B analyses, daily calibration verification includes successful demonstration of BFB sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest and all required system monitoring compounds, where applicable. The BFB tune must meet the ion abundance criteria (see table above). For 8260B, each SPCC in the calibration verification standard must meet the minimum response factors listed above. The CCC must achieve the criteria of +/- 20% RSD. For 524.2 & SM6200B, each target analyte must achieve a drift or difference

of +/-30% of the expected concentration. For V8260C each target analyte must achieve a drift or difference of +/-20% of the expected concentration.
Each internal standard in the CCV must recover between -50% to + 100%, when compared to the same internal standard compound in the mid-point standard of the initial calibration curve. Additionally, if the retention time of an internal standard changes by more than 30 seconds from the retention time of the same internal standard in the mid-level standard of the most recent initial calibration, the system must be evaluated, corrected, and possibly re-calibrated.

Daily calibration is accomplished for method 624 by a BFB tuning and analysis of a QC check standard. The BFB tune must meet EPA ion abundance criteria. The QC check standard must meet the criteria found in table 5 of the method.

Poor performing compounds for 8260B/524.2/SM6200B/624:

Propene	2-Chloroethylvinyl Ether
Dichlorodifluoromethane	Acrolein
Carbon Disulfide	Vinyl acetate
Bromomethane	trans-1,4-dichloro-2-butene
Chloroethane	Alcohols (Ethanol, TBA, TAA, ETBA, Butanol)
1,3-Butadiene	Iodomethane.
2,2-Dibromo-3-chloropropane	Naphthalene
1- Methylnaphthalene	2-Butanone
2- Methylnaphthalene	2-Hexanone
Acetone	4-Methyl-2-pentanone
Pentachloroethane	Cyclohexanone
Tert-butyl Formate	

8.5 ACCEPTANCE/REJECTION OF CALIBRATION

Organic Chemistry

The initial calibration curve is compared with previous curves for the same analyte. All new standard curves are immediately checked with a secondary source or laboratory control standard prepared from a separate source than those used for calibration. All curves are visually reviewed to ensure that acceptable correlation represents linearity. Calibration curves may be rejected for nonlinearity, abnormal sensitivity, or poor response of the laboratory control standard.

Continuing calibration verification is performed on each day that initial calibration is not performed and following every tenth sample for GC analyses and once per 12 hour shift for GCMS analyses. If a check standard does not perform within established criteria, the instrument is evaluated to determine the cause. Once the issue is corrected, all samples between the last in control sample and the first out of control check is re-analyzed.

TABLE 8.5: INSTRUMENT CALIBRATION

Instrument (Analysis)	Calibration Type	Minimum Number of Standards	Calibration Model	Acceptance/ Rejection Criteria	Frequency
GC (VOC)	Initial	3 –600 series	Avg. RF	Must be ≤10% RSD for 601/602,	As needed
		5 –All others	Avg. RF	≤20%RSD for 8021B, and ≤20% difference for 8015B	
	Second Source	1 Second Source	External	+/- 20% of true value	With each calibration
	Daily / Cont.	1/10	External	Must be within 20% of the initial calibration curve	Beginning, every 20
			Internal	Must be within 20% of the initial calibration curve	Every 12 hours
GC/MS VOC 8260/SM 6200B	Initial	5 –8000 series & SM 6200B	Avg. RF	8260B - Must be ≤15 %RSD for all target analytes and ≤30% for CCCs. 8260C - Must be ≤20 %RSD for all target analytes and ≤30% for CCCs. 6200B - Must be ≤20 %RSD for all target analytes. If Linear regression is used, an MRL check must pass +/-30%.	As needed
	Second Source	1 Second Source		8260B - Should recover within 20% for all CCC compounds and within 40% for other analytes of interest, with the exception of analytes known to perform poorly. 6200B – Should recover within 30% for all compounds, with the exception of analytes known to perform poorly	With each calibration
	Daily / Cont.	Tune & CCV every 12 hours		8260B/C - Must pass established method tuning criteria; 8260B - CCV must be ≤20% difference for CCC compounds, RF criteria for SPCC compounds must meet method criteria. Targets must meet ESC %drift criteria. 8260C/6200B – All targets meet designated minimum response factor, and all compounds ≤20% difference and 30% difference respectively, however for EPA 8260C, 20% of target compounds can fail. If any failures, an MRL check is analyzed.	Every 12 hours

Instrument (Analysis)	Calibration Type	Minimum Number of Standards	Calibration Model	Acceptance/ Rejection Criteria	Frequency
GC/MS VOC 624	Initial	3 –600 series	Avg. RF	624 - Must be ≤35 %RSD for all target analytes and ≤30% for CCCs	As needed
	Second Source	1 Second Source		Should recover within 20% for all CCC compounds and within 40% for other analytes of interest, with the exception of analytes known to perform poorly	With each calibration
	Daily / Cont.	Tune & CCV every 12 hours		Must pass established method tuning criteria; 624 - CCV must be ≤20% difference for CCC, RF for SPCC compounds must meet method criteria. Targets must meet ESC %drift criteria.	Every 12 hours

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent grade water is obtained from an ELGA Purelab Ultra system.

9.2 GLASSWARE WASHING PROCEDURE

All VOA sampling vials are purchased specifically for volatiles analysis and only used once. They are stored in a contaminant-free environment in the original carton with screw cap lids tightly fastened. All glassware used for volatiles analysis (volumetric flasks, syringes, etc.) is segregated from other laboratory glassware. Standard cleaning procedures involve rinsing three times with methanol. When a highly contaminated sample is purged, a blank is analyzed before another sample can be purged to ensure cleanliness of the analytical system. If the blank proves to be contaminant free, the system is then ready for further field sample analyses.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the volatiles laboratory can be found in the following table:

TABLE 10.1: VOLATILE DEPARTMENT SOPS

This table is subject to revision without notice

SOP #	Title/Description
330351	BTEX and Gasoline Range Organics by Gas Chromatography (8015B)
330354	MA Volatile Petroleum Hydrocarbons
330357	Volatile Organic Compounds (GRO by GCMS)
330363OH	Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry 8260A/B (Ohio VAP)
330363	Volatile Organic Compounds by Gas Chromatography/Mass

SOP #	Title/Description
	Spectrometry
330364	DW Volatile Organic Compounds by GC/MS (524.2)
330365	VOC Screen using RAE Systems PID ppbRAE
330375	GRO Analysis in Air (based on EPA 8015)
330751	5035 Closed System Purge and Trap and Extraction for VOC's in Soil and Waste
330751OH	5035 Closed System Purge and Trap and Extraction for VOC's in Soil for Ohio VAP
330752OH	5030B Purge and Trap for OH VAP Samples
330752	5030B Purge and Trap for Aqueous Samples
330753	Waste Dilution

11.0 QUALITY CONTROL CHECKS

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

11.1 ESC participates in proficiency testing (PTs) in support of various laboratory accreditations/recognitions. Environmental samples are purchased from Phenova. The WS, WP and solid matrix studies are completed every 6 months. PT samples are received and analyzed by method according to the vendor's instructions and according to ESC SOP.

11.2 Initial Demonstrations of Capability (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing Demonstration of Capability (CDOCs) must be updated at least annually. The associated data is filed within the department and available for review.

11.3 Matrix Spike and Matrix Spike Duplicates are performed on each batch of samples analyzed depending on analytical method requested.

11.4 A Laboratory Control Sample (LCS) and LCS Duplicate (LCSD) are analyzed one per batch of samples.

11.5 A method preparation blank is performed per batch of samples processed. If the acceptance criteria as listed in the determinative SOP is exceeded, the laboratory shall evaluate whether reprocessing of the samples is necessary, based on the following criteria:

- The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparation batch or
- The blank contamination is greater than 1/10 of the specified regulatory limit. The concentrations of common laboratory contaminants shall not exceed the reporting limit.

Any samples associated with a blank that fail these criteria shall be reprocessed in a subsequent preparation batch, except where the sample analysis resulted in non-detected results for the failing analytes.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in SOP #030201, *Data Handling and Reporting.* A secondary review of the data package is performed according to ESC SOP #030227, *Data Review*. The reviewer verifies that the analysis has been performed as required and meets method criteria, all associate data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required flags on test reports, etc.)

TABLE 12.1 Data Reduction Formulas

PARAMETER	FORMULA
GC	response of sample analyte {*area*} x final extract volume {*mL*} x dilution response factor {*area/(mg/L)*} x initial extract volume-mass {*mL or g*} *Calculations performed by HP Enviroquant Software*
GC/MS	response of analyte {*area*} x extract volume {*mL*} x dilution x int. std amt. {*area*} response factor {*area/(mg/mL)*} x initial volume-mass {*mL or g*} x int. std cal. {area} *Calculations performed by HP Enviroquant Software*

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.3 by method for current QC targets and controls and current reporting limits.

Marginal Exceedance – When a large number of analytes exist in the LCS, it is statistically possible for a few analytes to be outside established control limits while the analytical system remains in control. These excursions must be random in nature and, if not, a review of the control limits or analytical process is necessary.

Upper and lower marginal exceedance (ME) limits are established as the mean of at least 20 data points ± four times their standard deviations. The number of allowable marginal exceedances per event is based on the number of analytes spiked in the LCS.

Allowable Marginal Exceedance per Event	
Analytes in LCS:	**ME Allowable**
>90	5
71-90	4
51-70	3
31-50	2
11-30	1
<11	0

Organic Control Limits - The organic QC targets are statutory in nature; warning and control limits for organic analyses are initially established for groups of compounds based on preliminary method validation data. When additional data becomes available, the QC targets are reviewed. All QC targets are routinely re-evaluated at least annually (and updated, if necessary) against laboratory historical data to insure that the limits continue to reflect realistic, method achievable goals.

12.3 REPORTING

Reporting procedures are documented in SOP #030201, *Data Handling and Reporting.*

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	1,1,1,2-TETRACHLOROETHANE	8260B/C, 624, 6200B	GW, WW	78.5-125	20.0	0.001	mg/L
Volatiles	1,1,1-TRICHLOROETHANE	8260B/C, 624, 6200B	GW, WW	71.1-129	20.0	0.001	mg/L
Volatiles	1,1,2,2-TETRACHLOROETHANE	8260B/C, 624, 6200B	GW, WW	79.3-123	20.0	0.001	mg/L
Volatiles	1,1,2-TRICHLOROETHANE	8260B/C, 624, 6200B	GW, WW	81.6-120	20.0	0.001	mg/L
Volatiles	1,1,2-TRICHLORO-TRIFLUOROETHANE	8260B/C, 624, 6200B	GW, WW	62.0-141	20.0	0.001	mg/L
Volatiles	1,1-DICHLOROETHANE	8260B/C, 624, 6200B	GW, WW	71.7-127	20.0	0.001	mg/L
Volatiles	1,1-DICHLOROETHENE	8260B/C, 624, 6200B	GW, WW	59.9-137	20.0	0.001	mg/L
Volatiles	1,1-DICHLOROPROPENE	8260B/C, 624, 6200B	GW, WW	72.5-127	20.0	0.001	mg/L
Volatiles	1,2,3-TRICHLOROBENZENE	8260B/C, 624, 6200B	GW, WW	75.7-134	20.0	0.001	mg/L
Volatiles	1,2,3-TRICHLOROPROPANE	8260B/C, 624, 6200B	GW, WW	74.9-124	20.0	0.0025	mg/L
Volatiles	1,2,3-TRIMETHYLBENZENE	8260B/C, 624, 6200B	GW, WW	79.9-118	20.0	0.001	mg/L
Volatiles	1,2,4-TRICHLOROBENZENE	8260B/C, 624, 6200B	GW, WW	76.1-136	20.0	0.001	mg/L
Volatiles	1,2,4-TRIMETHYLBENZENE	8260B/C, 624, 6200B	GW, WW	79.0-122	20.0	0.001	mg/L
Volatiles	1,2-DIBROMO-3-CHLOROPROPANE	8260B/C, 624, 6200B	GW, WW	64.8-131	20.0	0.005	mg/L
Volatiles	1,2-DIBROMOETHANE	8260B/C, 624, 6200B	GW, WW	79.8-122	20.0	0.001	mg/L
Volatiles	1,2-DICHLOROBENZENE	8260B/C, 624, 6200B	GW, WW	84.7-118	20.0	0.001	mg/L
Volatiles	1,2-DICHLOROETHANE	8260B/C, 624, 6200B	GW, WW	65.3.-126	20.0	0.001	mg/L

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	1,2-DICHLOROPROPANE	8260B/C, 624, 6200B	GW, WW	77.4-125	20.0	0.001	mg/L
Volatiles	1,3,5-TRIMETHYLBENZENE	8260B/C, 624, 6200B	GW, WW	81.0-123	20.0	0.001	mg/L
Volatiles	1,3-BUTADIENE	8260B/C, 624, 6200B	GW, WW	36.2-142	20.0	0.002	mg/L
Volatiles	1,3-DICHLOROBENZENE	8260B/C, 624, 6200B	GW, WW	77.6-127	20.0	0.001	mg/L
Volatiles	1,3-DICHLOROPROPANE	8260B/C, 624, 6200B	GW, WW	80.6-115	20.0	0.001	mg/L
Volatiles	1,4-DICHLOROBENZENE	8260B/C, 624, 6200B	GW, WW	82.2-114	20.0	0.001	mg/L
Volatiles	1-METHYLNAPHTHALENE	8260B/C, 624, 6200B	GW, WW	48.8-157	20.0	0.01	mg/L
Volatiles	2,2-DICHLOROPROPANE	8260B/C, 624, 6200B	GW, WW	61.3-134	20.0	0.001	mg/L
Volatiles	2-BUTANONE (MEK)	8260B/C, 624, 6200B	GW, WW	46.4-155	20.0	0.01	mg/L
Volatiles	2-CHLOROETHYL VINYL ETHER	8260B/C, 624, 6200B	GW, WW	23.4-162	23.5	0.05	mg/L
Volatiles	2-CHLOROTOLUENE	8260B/C, 624, 6200B	GW, WW	76.4-125	20.0	0.001	mg/L
Volatiles	2-HEXANONE	8260B/C, 624, 6200B	GW, WW	59.4-151	20.0	0.01	mg/L
Volatiles	2-METHYLNAPHTHALENE	8260B/C, 624, 6200B	GW, WW	55.6-154	20.0	0.01	mg/L
Volatiles	4-CHLOROTOLUENE	8260B/C, 624, 6200B	GW, WW	81.5-121	20.0	0.001	mg/L
Volatiles	4-ETHYLTOLUENE	8260B/C, 624, 6200B	GW, WW	69.5-137	20.0	0.001	mg/L
Volatiles	4-METHYL-2-PENTANONE (MIBK)	8260B/C, 624, 6200B	GW, WW	63.3-138	20.0	0.01	mg/L
Volatiles	ACETONE	8260B/C, 624, 6200B	GW, WW	28.7-175	20.9	0.01	mg/L
Volatiles	ACROLEIN	8260B/C, 624, 6200B	GW, WW	40.4-172	20.0	0.05	mg/L
Volatiles	ACRYLONITRILE	8260B/C, 624, 6200B	GW, WW	58.2-145	20.0	0.01	mg/L
Volatiles	BENZENE	8260B/C, 624, 6200B	GW, WW	73.0-122	20.0	0.001	mg/L
Volatiles	BROMOBENZENE	8260B/C, 624, 6200B	GW, WW	81.5-115	20.0	0.001	mg/L
Volatiles	BROMOCHLOROMETHANE	8260B/C, 624, 6200B	GW, WW	78.9-123	20.0	0.001	mg/L
Volatiles	BROMODICHLOROMETHANE	8260B/C, 624, 6200B	GW, WW	75.5-121	20.0	0.001	mg/L
Volatiles	BROMOFORM	8260B/C, 624, 6200B	GW, WW	71.5-131	20.0	0.001	mg/L
Volatiles	BROMOMETHANE	8260B/C, 624, 6200B	GW, WW	22.4-187	20.0	0.005	mg/L
Volatiles	CARBON DISULFIDE	8260B/C, 624, 6200B	GW, WW	53.0-134	20.0	0.001	mg/L
Volatiles	CARBON TETRACHLORIDE	8260B/C, 624, 6200B	GW, WW	70.9-129	20.0	0.001	mg/L
Volatiles	CHLOROBENZENE	8260B/C, 624, 6200B	GW, WW	79.7-122	20.0	0.001	mg/L
Volatiles	CHLORODIBROMOMETHANE	8260B/C, 624, 6200B	GW, WW	78.2-124	20.0	0.001	mg/L
Volatiles	CHLOROETHANE	8260B/C, 624, 6200B	GW, WW	41.2-153	20.0	0.005	mg/L
Volatiles	CHLOROFORM	8260B/C, 624, 6200B	GW, WW	73.2-125	20.0	0.005	mg/L
Volatiles	CHLOROMETHANE	8260B/C, 624, 6200B	GW, WW	55.8-134	20.0	0.025	mg/L
Volatiles	CIS-1,2-DICHLOROETHENE	8260B/C, 624, 6200B	GW, WW	77.3-122	20.0	0.001	mg/L
Volatiles	CIS-1,3-DICHLOROPROPENE	8260B/C, 624, 6200B	GW, WW	77.7-124	20.0	0.001	mg/L
Volatiles	DIBROMOMETHANE	8260B/C, 624, 6200B	GW, WW	78.8-119	20.0	0.001	mg/L

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	DICHLORODIFLUORO-METHANE	8260B/C, 624, 6200B	GW, WW	56.0-134	20.0	0.005	mg/L
Volatiles	DICHLOROFLUORO-METHANE	8260B/C, 624, 6200B	GW, WW	53.5-145	20.0	0.005	mg/L
Volatiles	DICYCLOPENTADIENE	8260B/C, 624, 6200B	GW, WW	73.4-126	20.0	0.001	mg/L
Volatiles	DI-ISOPROPYL ETHER	8260B/C, 624, 6200B	GW, WW	65.1-135	20.0	0.001	mg/L
Volatiles	ETHYL ETHER	8260B/C, 624, 6200B	GW, WW	56.6-136	20.0	0.001	mg/L
Volatiles	ETHYLBENZENE	8260B/C, 624, 6200B	GW, WW	80.9-121	20.0	0.001	mg/L
Volatiles	HEXACHLORO-1,3-BUTADIENE	8260B/C, 624, 6200B	GW, WW	73.7-133	20.0	0.001	mg/L
Volatiles	IODOMETHANE	8260B/C, 624, 6200B	GW, WW	64.6-137	20.0	0.01	mg/L
Volatiles	ISOPROPYLBENZENE	8260B/C, 624, 6200B	GW, WW	81.6-124	20.0	0.001	mg/L
Volatiles	M&P-XYLENE	8260B/C, 624, 6200B	GW, WW	78.5-122	20.0	0.002	mg/L
Volatiles	METHYL TERT-BUTYL ETHER	8260B/C, 624, 6200B	GW, WW	70.1-125	20.0	0.001	mg/L
Volatiles	METHYLENE CHLORIDE	8260B/C, 624, 6200B	GW, WW	69.5-120	20.0	0.005	mg/L
Volatiles	NAPHTHALENE	8260B/C, 624, 6200B	GW, WW	69.7-134	20.0	0.005	mg/L
Volatiles	N-BUTYLBENZENE	8260B/C, 624, 6200B	GW, WW	75.9-134	20.0	0.001	mg/L
Volatiles	N-HEXANE	8260B/C, 624, 6200B	GW, WW	59.5-132	20.0	0.01	mg/L
Volatiles	N-PROPYLBENZENE	8260B/C, 624, 6200B	GW, WW	81.9-122	20.0	0.001	mg/L
Volatiles	O-XYLENE	8260B/C, 624, 6200B	GW, WW	79.1-123	20.0	0.001	mg/L
Volatiles	P-ISOPROPYLTOLUENE	8260B/C, 624, 6200B	GW, WW	77.6-129	20.0	0.001	mg/L
Volatiles	PROPENE	8260B/C, 624, 6200B	GW, WW	10.0-200	20.0	0.0025	mg/L
Volatiles	SEC-BUTYLBENZENE	8260B/C, 624, 6200B	GW, WW	80.6-126	20.0	0.001	mg/L
Volatiles	STYRENE	8260B/C, 624, 6200B	GW, WW	79.9-124	20.0	0.001	mg/L
Volatiles	TERT-BUTYLBENZENE	8260B/C, 624, 6200B	GW, WW	79.3-127	20.0	0.001	mg/L
Volatiles	TETRACHLOROETHENE	8260B/C, 624, 6200B	GW, WW	73.5-130	20.0	0.001	mg/L
Volatiles	TETRAHYDROFURAN	8260B/C, 624, 6200B	GW, WW	54.0-134	20.0	0.005	mg/L
Volatiles	TOLUENE	8260B/C, 624, 6200B	GW, WW	77.9-116	20.0	0.005	mg/L
Volatiles	TPH (GC/MS) LOW FRACTION	8260B/C, 624, 6200B	GW, WW	62.3-131	20.0	0.50	mg/L
Volatiles	TRANS-1,2-DICHLOROETHENE	8260B/C, 624, 6200B	GW, WW	72.6-125	20.0	0.001	mg/L
Volatiles	TRANS-1,3-DICHLOROPROPENE	8260B/C, 624, 6200B	GW, WW	73.5-127	20.0	0.001	mg/L
Volatiles	TRANS-1,4-DICHLORO-2-BUTENE	8260B/C, 624, 6200B	GW, WW	58.3-129	20.0	0.0025	mg/L
Volatiles	TRICHLOROETHENE	8260B/C, 624, 6200B	GW, WW	79.5-121	20.0	0.001	mg/L
Volatiles	TRICHLOROFLUORO-METHANE	8260B/C, 624, 6200B	GW, WW	49.1-157	20.0	0.005	mg/L
Volatiles	VINYL ACETATE	8260B/C, 624, 6200B	GW, WW	41.7-159	20.0	0.01	mg/L

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	VINYL CHLORIDE	8260B/C, 624, 6200B	GW, WW	61.5-134	20.0	0.001	mg/L
Volatiles	XYLENES, TOTAL	8260B/C, 624, 6200B	GW,WW	79.2-122	20.0	0.002	mg/L
Volatiles	1,1,1,2-TETRACHLOROETHANE	8260B/C	Solid	76.7-127	20.0	0.001	mg/kg
Volatiles	1,1,1-TRICHLOROETHANE	8260B/C	Solid	69.9-127	20.0	0.001	mg/kg
Volatiles	1,1,2,2-TETRACHLOROETHANE	8260B/C	Solid	78.8-124	20.0	0.001	mg/kg
Volatiles	1,1,2-TRICHLOROETHANE	8260B/C	Solid	81.9-119	20.0	0.001	mg/kg
Volatiles	1,1,2-RICHLOROTRIFLUORO-ETHANE	8260B/C	Solid	62.6-138	20.0	0.001	mg/kg
Volatiles	1,1-DICHLOROETHANE	8260B/C	Solid	71.7-125	20.0	0.001	mg/kg
Volatiles	1,1-DICHLOROETHENE	8260B/C	Solid	60.6-133	20.0	0.001	mg/kg
Volatiles	1,1-DICHLOROPROPENE	8260B/C	Solid	71.2-126	20.0	0.001	mg/kg
Volatiles	1,2,3-TRICHLOROBENZENE	8260B/C	Solid	72.5-137	20.0	0.001	mg/kg
Volatiles	1,2,3-TRICHLOROPROPANE	8260B/C	Solid	74.0-124	20.0	0.0025	mg/kg
Volatiles	1,2,3-TRIMETHYLBENZENE	8260B/C	Solid	79.4-118	20.0	0.001	mg/kg
Volatiles	1,2,4-TRICHLOROBENZENE	8260B/C	Solid	74.0-137	20.0	0.001	mg/kg
Volatiles	1,2,4-TRIMETHYLBENZENE	8260B/C	Solid	77.1-124	20.0	0.001	mg/kg
Volatiles	1,2-DIBROMO-3-CHLOROPROPANE	8260B/C	Solid	64.9-131	20.0	0.005	mg/kg
Volatiles	1,2-DIBROMOETHANE	8260B/C	Solid	78.7-123	20.0	0.001	mg/kg
Volatiles	1,2-DICHLOROBENZENE	8260B/C	Solid	83.6-119	20.0	0.001	mg/kg
Volatiles	1,2-DICHLOROETHANE	8260B/C	Solid	67.2-121	20.0	0.001	mg/kg
Volatiles	1,2-DICHLOROPROPANE	8260B/C	Solid	76.9-123	20.0	0.001	mg/kg
Volatiles	1,3,5-TRIMETHYLBENZENE	8260B/C	Solid	79.0-125	20.0	0.001	mg/kg
Volatiles	1,3-BUTADIENE	8260B/C	Solid	35.1-134	20.0	0.002	mg/kg
Volatiles	1,3-DICHLOROBENZENE	8260B/C	Solid	75.9-129	20.0	0.001	mg/kg
Volatiles	1,3-DICHLOROPROPANE	8260B/C	Solid	80.3-114	20.0	0.001	mg/kg
Volatiles	1,4-DICHLOROBENZENE	8260B/C	Solid	81.0-115	20.0	0.001	mg/kg
Volatiles	1-METHYLNAPHTHALENE	8260B/C	Solid	60.4-138	24.7	0.01	mg/kg
Volatiles	2,2-DICHLOROPROPANE	8260B/C	Solid	61.9-132	20.0	0.001	mg/kg
Volatiles	2-BUTANONE (MEK)	8260B/C	Solid	44.5-154	21.3	0.01	mg/kg
Volatiles	2-CHLOROETHYL VINYL ETHER	8260B/C	Solid	16.7-162	23.7	0.05	mg/kg
Volatiles	2-CHLOROTOLUENE	8260B/C	Solid	74.6-127	20.0	0.001	mg/kg
Volatiles	2-HEXANONE	8260B/C	Solid	62.7-150	20.0	0.01	mg/kg
Volatiles	2-METHYLNAPHTHALENE	8260B/C	Solid	63.3-137	21.5	0.01	mg/kg
Volatiles	4-CHLOROTOLUENE	8260B/C	Solid	79.5-123	20.0	0.001	mg/kg
Volatiles	4-ETHYLTOLUENE	8260B/C	Solid	78.0-127	20.0	0.001	mg/kg

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	4-METHYL-2-PENTANONE (MIBK)	8260B/C	Solid	61.1-138	20.0	0.01	mg/kg
Volatiles	ACETONE	8260B/C	Solid	25.3-178	22.9	0.01	mg/kg
Volatiles	ACROLEIN	8260B/C	Solid	41.0-182	20.0	0.05	mg/kg
Volatiles	ACRYLONITRILE	8260B/C	Solid	57.8-143	20.0	0.01	mg/kg
Volatiles	BENZENE	8260B/C	Solid	72.6-120	20.0	0.001	mg/kg
Volatiles	BROMOBENZENE	8260B/C	Solid	80.3-115	20.0	0.001	mg/kg
Volatiles	BROMOCHLOROMETHANE	8260B/C	Solid	79..7-123	20.0	0.001	mg/kg
Volatiles	BROMODICHLOROMETHANE	8260B/C	Solid	75.3-119	20.0	0.001	mg/kg
Volatiles	BROMOFORM	8260B/C	Solid	69.1-135	20.0	0.001	mg/kg
Volatiles	BROMOMETHANE	8260B/C	Solid	23.0-191	20.0	0.005	mg/kg
Volatiles	CARBON DISULFIDE	8260B/C	Solid	49.9-136	20.0	0.001	mg/kg
Volatiles	CARBON TETRACHLORIDE	8260B/C	Solid	69.4-129	20.0	0.001	mg/kg
Volatiles	CHLOROBENZENE	8260B/C	Solid	78.9-122	20.0	0.001	mg/kg
Volatiles	CHLORODIBROMOMETHANE	8260B/C	Solid	76.4-126	20.0	0.005	mg/kg
Volatiles	CHLOROETHANE	8260B/C	Solid	47.2-147	20.0	0.005	mg/kg
Volatiles	CHLOROFORM	8260B/C	Solid	73.3-122	20.0	0.025	mg/kg
Volatiles	CHLOROMETHANE	8260B/C	Solid	53.1-135	20.0	0.001	mg/kg
Volatiles	CIS-1,2-DICHLOROETHENE	8260B/C	Solid	76.1-121	20.0	0.001	mg/kg
Volatiles	CIS-1,3-DICHLOROPROPENE	8260B/C	Solid	77.3-123	20.0	0.001	mg/kg
Volatiles	DIBROMOMETHANE	8260B/C	Solid	78.5-117	20.0	0.005	mg/kg
Volatiles	DICHLORODIFLUORO-METHANE	8260B/C	Solid	50.9-139	20.0	0.005	mg/kg
Volatiles	DICHLOROFLUORO-METHANE	8260B/C	Solid	61.8-140	20.0	0.001	mg/kg
Volatiles	DICYCLOPENTADIENE	8260B/C	Solid	73.1-126	20.0	0.001	mg/kg
Volatiles	DI-ISOPROPYL ETHER	8260B/C	Solid	67.2-131	20.0	0.001	mg/kg
Volatiles	ETHYL ETHER	8260B/C	Solid	57.5-136	20.0	0.001	mg/kg
Volatiles	ETHYLBENZENE	8260B/C	Solid	78.6-124	20.0	0.001	mg/kg
Volatiles	HEXACHLORO-1,3-BUTADIENE	8260B/C	Solid	69.2-136	20.0	0.01	mg/kg
Volatiles	IODOMETHANE	8260B/C	Solid	63.3-136	20.0	0.001	mg/kg
Volatiles	ISOPROPYLBENZENE	8260B/C	Solid	79.4-126	20.0	0.002	mg/kg
Volatiles	M&P-XYLENE	8260B/C	Solid	77.3-124	20.0	0.001	mg/kg
Volatiles	METHYL TERT-BUTYL ETHER	8260B/C	Solid	70.2-122	20.0	0.005	mg/kg
Volatiles	METHYLENE CHLORIDE	8260B/C	Solid	68.2-119	20.0	0.005	mg/kg
Volatiles	NAPHTHALENE	8260B/C	Solid	69.9-132	20.0	0.001	mg/kg
Volatiles	N-BUTYLBENZENE	8260B/C	Solid	74.2-134	20.0	0.01	mg/kg
Volatiles	N-HEXANE	8260B/C	Solid	59.9-125	20.0	0.001	mg/kg

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	N-PROPYLBENZENE	8260B/C	Solid	80.2-124	20.0	0.001	mg/kg
Volatiles	O-XYLENE	8260B/C	Solid	78.5-124	20.0	0.001	mg/kg
Volatiles	P-ISOPROPYLTOLUENE	8260B/C	Solid	75.4-132	20.0	0.0025	mg/kg
Volatiles	PROPENE	8260B/C	Solid	10.0-192	26.1	0.001	mg/kg
Volatiles	SEC-BUTYLBENZENE	8260B/C	Solid	77.8-129	20.0	0.001	mg/kg
Volatiles	STYRENE	8260B/C	Solid	79.4-124	20.0	0.001	mg/kg
Volatiles	TERT-BUTYLBENZENE	8260B/C	Solid	77.2-129	20.0	0.001	mg/kg
Volatiles	TETRACHLOROETHENE	8260B/C	Solid	71.1-133	20.0	0.005	mg/kg
Volatiles	TETRAHYDROFURAN	8260B/C	Solid	63.4-122	20.0	0.005	mg/kg
Volatiles	TOLUENE	8260B/C	Solid	76.7-116	20.0	0.50	mg/kg
Volatiles	TPH (GC/MS) LOW FRACTION	8260B/C	Solid	61.5-138	20.0	0.001	mg/kg
Volatiles	TRANS-1,2-DICHLOROETHENE	8260B/C	Solid	70.7-124	20.0	0.001	mg/kg
Volatiles	TRANS-1,3-DICHLOROPROPENE	8260B/C	Solid	73.0-127	20.0	0.0025	mg/kg
Volatiles	TRANS-1,4-DICHLORO-2-BUTENE	8260B/C	Solid	58.4-125	20.0	0.001	mg/kg
Volatiles	TRICHLOROETHENE	8260B/C	Solid	77.2-122	20.0	0.001	mg/kg
Volatiles	TRICHLOROFLUORO-METHANE	8260B/C	Solid	51.5-151	20.0	0.005	mg/kg
Volatiles	VINYL ACETATE	8260B/C	Solid	39.8-156	20.0	0.01	mg/kg
Volatiles	VINYL CHLORIDE	8260B/C	Solid	58.4-134	20.0	0.001	mg/kg
Volatiles	XYLENES, TOTAL	8260B/C	Solid	78.1-123	20.0	0.002	mg/kg
Volatiles	DI-ISOPROPYL ETHER	8260B/C	Solid	70.4-133	20.0	0.001	mg/kg
Volatiles	ETHYL TERT-BUTYL ETHER	8260B/C	Solid	81.4-110	25.0	0.001	mg/kg
Volatiles	METHYL-TERT-BUTYL ETHER	8260B/C	Solid	73.0-129	20.0	0.001	mg/kg
Volatiles	TERT-BUTYL ALCOHOL	8260B/C	Solid	59.5-170	25.0	0.050	mg/kg
Volatiles	TERT-AMYL METHYL ETHER	8260B/C	Solid	82-115	25.0	0.001	mg/kg
Volatiles	2-PROPANOL	8260B/C	Solid	70.0-130	25.0	0.05	mg/kg
Volatiles	GRO	8015B/C/D	GW, WW	66.3-133	20.0	0.100	mg/L
Volatiles	BENZENE	8021B, 602, 6200C	GW, WW	70.0-130	20.0	0.0005	mg/L
Volatiles	TOLUENE	8021B, 602, 6200C	GW, WW	70.0-130	20.0	0.005	mg/L
Volatiles	ETHYLBENZENE	8021B, 602, 6200C	GW, WW	70.0-130	20.0	0.0005	mg/L
Volatiles	M&P-XYLENE	8021B, 602, 6200C	GW, WW	70.0-130	20.0	0.001	mg/L
Volatiles	O-XYLENE	8021B, 602, 6200C	GW, WW	70.0-130	20.0	0.0005	mg/L
Volatiles	MTBE	8021B, 602, 6200C	GW, WW	70.0-130	20.0	0.001	mg/L
Volatiles	GRO	8015B/C/D	Solid	63.6-136	20.0	0.10	mg/kg
Volatiles	BENZENE	8021B	Solid	70.0 - 130	20.0	0.0005	mg/kg

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	TOLUENE	8021B	Solid	70.0 - 130	20.0	0.005	mg/kg
Volatiles	ETHYLBENZENE	8021B	Solid	70.0 - 130	20.0	0.001	mg/kg
Volatiles	M&P-XYLENE	8021B	Solid	70.0 - 130	20.0	0.001	mg/kg
Volatiles	O-XYLENE	8021B	Solid	70.0 - 130	20.0	0.0005	mg/kg
Volatiles	MTBE	8021B	Solid	70.0 - 130	20.0	0.001	mg/kg
Volatiles	1,1,1,2-TETRACHLOROETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,1,1-TRICHLOROETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,1,2,2-TETRACHLOROETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,1,2-TRICHLOROETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,1-DICHLOROETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,1-DICHLOROETHENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,1-DICHLOROPROPENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,2,3-TRICHLOROBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,2,3-TRICHLOROPROPANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,2,4-TRICHLOROBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,2,4-TRIMETHYLBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,2-DIBROMO-3-CHLOROPROPANE	524.2	DW	70.0-130	25.0	0.0010	mg/L
Volatiles	1,2-DIBROMOETHANE	524.2	DW	70.0-130	25.0	0.0010	mg/L
Volatiles	1,2-DICHLOROBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,2-DICHLOROETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,2-DICHLOROPROPANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,3,5-TRIMETHYLBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,3-DICHLOROBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,3-DICHLOROPROPANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	1,4-DICHLOROBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	2,2-DICHLOROPROPANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	2-CHLOROTOLUENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	4-CHLOROTOLUENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	4-ISOPROPYLTOLUENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	ACETONE	524.2	DW	70.0-130	25.0	0.01	mg/L
Volatiles	BENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	BROMOBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	BROMOCHLOROMETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	BROMODICHLOROMETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L

Table 12.3: QC Targets for Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)**	Prec.** (RPD)	RL	Unit
Volatiles	BROMOFORM	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	BROMOMETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	CARBON TETRACHLORIDE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	CHLOROBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	CHLOROETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	CHLOROFORM	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	CHLOROMETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	CIS-1,2-DICHLOROETHENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	CIS-1,3-DICHLOROPROPENE	524.2	DW	70.0-130	25.0	0.0010	mg/L
Volatiles	DIBROMOMETHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	DICHLORODIFLUORO-METHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	ETHYLBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	HEXACHLOROBUTADIENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	ISOPROPYLBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	METHYLENE CHLORIDE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	METHYL-T-BUTYL ETHER	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	NAPHTHALENE	524.2	DW	70.0-130	25.0	0.0050	mg/L
Volatiles	N-BUTYLBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	N-PROPYLBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	SEC-BUTYLBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	STYRENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	TERT-BUTYLBENZENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	TETRACHLOROETHENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	TOLUENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	TRANS-1,2-DICHLOROETHENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	TRANS-1,3-DICHLOROPROPENE	524.2	DW	70.0-130	25.0	0.0010	mg/L
Volatiles	TRICHLOROETHENE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	TRICHLOROFLUORO-METHANE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	VINYL CHLORIDE	524.2	DW	70.0-130	25.0	0.0005	mg/L
Volatiles	XYLENES – TOTAL	524.2	DW	70.0-130	25.0	0.0015	mg/L

*** Specific organizations may require limits that supersede the values listed.*

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CARs are kept on file by the Regulatory Affairs Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these limits are exceeded, corrective action must be taken. Calculated sample spike control limits are also used.

All samples and procedures are governed by ESC's quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP.

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory, the method criteria takes precedence.

13.2.2 Out Of Control Blanks: Applies to Method, Trip, Rinsate & Instrument Blanks

Rejection Criteria - Blank reading is more than twice the background absorbance or more than ½RL.

Corrective Action - Blanks are re-analyzed and the response is assessed. Standard curves and samples are evaluated for any obvious contamination that is isolated or uniform throughout the run. If necessary, reagents are re-prepared. Analyses are not initiated until the problem is identified and solved. If samples have already been prepared or analyzed, the Department Supervisor is consulted to determine if data needs to be rejected or if samples need to be re-prepared.

13.2.3 Out Of Control Laboratory Control Standards (LCS & LCSD)

Rejection Criteria - If the performance is outside of lab-generated control limits which are calculated as the mean of at least 20 data points +/- 3 times the standard deviation of those points (Listed in Section 12) and the marginal excedence allowance is surpassed (see section 12.2).

Corrective Action - Instrument settings are checked and the LCS standard is re-analyzed. If the LCS is still out of control, instrumentation is checked for systemic problems and repaired (if necessary). Re-calibration is performed and the samples affected since the last in control reference standard are reanalyzed. The group leader or Department Supervisor is consulted for further action.

13.2.4 Out Of Control Matrix Spike Samples

Rejection Criteria - If either the MS or MSD sample is outside the established control limits.

Corrective Action - Any compound that is outside of these limits is considered to be 'out of control' and must be qualified appropriately. Batch acceptance, however, is based on method blank and LCS performance, not on MS/MSD recoveries. Specific methods, customers, and programs may require further corrective action in some cases.

13.2.5 Out Of Control Duplicate Samples

Rejection Criteria - Lab-generated maximum RPD limit (as listed under precision in Section 12)

Corrective Action - Any compound that is outside of these limits is considered to be 'out of control' and must be qualified appropriately. Batch acceptance, however, is based on method blank and LCS performance. Specific methods, customers, and programs may require further corrective action in some cases.

13.2.7 Out Of Control Calibration Standards: ICV, CCV, SSCV

Rejection Criteria - If the performance is outside of method requirements.

Corrective Action - Instrument settings are checked, calibration verification standard is re-analyzed. If the standard is still out of control, re-calibration is performed, and samples affected since the last in control reference standard are rerun. The group leader or Department Supervisor is consulted for further action.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #030230, *Standards Logger, SOP #030227, Data Review* and SOP #030201, *Data Handling and Reporting*

Volatile organics calibration data are recorded and integrated using HP Enviroquant software. Calibration data from the volatile analyses, in addition to the initial and daily calibration, includes GC/MS autotunes, BFB reports and surrogate recovery reports. PDF records of initial calibration and daily calibration are stored with chromatograms and integrated with sample data by date analyzed.

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 13.0 and *SOP #010104, Internal Audits*.

16.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix VI)	General – Replaced the term “client” with the term “customer” Table 8.1 – Updated Equipment List Table 8.3A – Updated Standards Table 10.1 – Updated SOP List

1.0 SIGNATORY APPROVALS

Semi-Volatile
QUALITY ASSURANCE MANUAL

APPENDIX VII TO THE ESC QUALITY ASSURANCE MANUAL

for

ESC LAB SCIENCES
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Prepared by

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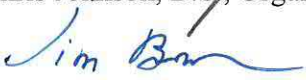
NOTE: The QAM has been approved by the following people.

Chris Johnson, B.S., Organics Manager 615-773-9774



Jim Brownfield, B.S., Compliance Director 615-773-9681

Steve Miller, B.S., Quality Assurance Manager, 615-773-9684

2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that analytical data generated from the Semi-Volatile (SVOC) laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in non-conforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the customer with both routine and specialized services, field sampling guidance and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Chris Johnson, with a B.S. degree in Biology, is the Organics Manager and is responsible for the overall production of these laboratories; including the management of the staff and scheduling. Mr. Johnson has over 15 years of environmental laboratory experience.

In his absence, Blake Judge assumes responsibility for SVOC departmental decisions. Mr. Judge has a B.S. degree in Chemistry and is a Senior Chemist in the SVOC Department. He is proficient in semi-volatile organic analytical methods and has over 10 years of environmental laboratory experience.

5.2 TRAINING

5.2.1 All new analysts to the laboratory are trained by a Chemist or Department Lead according to ESC protocol. ESC's training program is outlined in *SOP 030205 Technical Training and Personnel Qualifications.* Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in SVOC analyses and preparation is also demonstrated by acceptable participation in multiple proficiency testing programs (PTs) and daily Quality Control sample analyses. Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the instrumentation laboratory in Building #5 has nearly 1500 square feet with approximately 500 square feet of bench area. The 4000 square feet of area in the extraction laboratory includes roughly 330 square feet of bench area with 245 square feet of hood space. There is an additional 2000 square feet of storage for this laboratory. The air system is a 15-ton make-up unit plus 15-ton HVAC with electric heat. The physical and air-handling separations, between this laboratory and other ESC sections, prevent potential cross-contamination between solvent vapor generation and incompatible analytical processes. The laboratory reagent water is provided through the US Filter deionizer system. Waste disposal containers are located in the laboratory and Clean Harbors serves as ESC's waste disposal carrier as discussed in detail in Section 6.0 of the ESC Quality Assurance Manual. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods.
- ESC's laboratory safety guidelines are detailed in the *ESC Chemical Hygiene Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Matrices for SVOC environmental analyses include groundwater, wastewater, drinking water, soil, and sludge.
- Sample containers, preservation methods and holding times vary depending on analyses requested. Please see determinative procedures for specific directions.
- Plastic containers or lids may NOT be used for the storage of samples due to possible contamination from the phthalate esters and other hydrocarbons.
- Environmental sample containers should be filled carefully to prevent any portion of the sample from coming into contact with the sampler's gloves causing possible phthalate contamination.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Semi-Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph 2	HP	6890	svcompa	2	US00004397	SVOC
Gas Chromatograph 7	Agilent	6890	svcompe	7	US10350064	SVOC
Gas Chromatograph 8	Agilent	6890	svcompp	8	DE00022534	SVOC
Gas Chromatograph 9	HP	6890	svcompj	9	US00029095	SVOC
Gas Chromatograph 10	Agilent	6890	svcompk	10	US00039655	SVOC
Gas Chromatograph 11	Agilent	6890	svcompn	11	US00040550	SVOC
Gas Chromatograph 12	Agilent	6890	svcompo	12	US00034155	SVOC
Gas Chromatograph 13	HP	6890	svcomps	13	US00010364	SVOC
Gas Chromatograph 14	HP	6890	svcompt	14	US00020581	SVOC
Gas Chromatograph 16	Agilent	6890	svcompv	16	US10212071	SVOC
Gas Chromatograph 17	Agilent	6890	svcompw	17	US10344078	SVOC
Gas Chromatograph 18	Agilent	6890	svcompd	18	US10351038	SVOC
Gas Chromatograph 19	Agilent	6890	svcompaa	19	CN10516070	SVOC
Gas Chromatograph 20	Agilent	6890	svcompab	20	CN10543031	SVOC
Gas Chromatograph 21	Agilent	7890	svcompae	21	CN 10730070	SVOC
Gas Chromatograph 22	Agilent	7890	svcompaf	22	CN 10730081	SVOC
Gas Chromatograph 23	Agilent	6890	svcompag	23	CN 92174366	SVOC
Gas Chromatograph 24	Agilent	6890	svcompah	24	CN 92174369	SVOC
Gas Chromatograph 25	Agilent	7890	svcompaj	25	CN 10091009	SVOC
Gas Chromatograph 26	Agilent	7890	Svcompar	26	CN11501138	SVOC
Gas Chromatograph 27	Agilent	7890	Svcompas	27	CN11501139	SVOC
Gas Chromatograph 28	Agilent	7890	Svcompat	28	US11521018	SVOC
Gas Chromatograph 29	Agilent	7890	Svcompau	29	CN11521077	SVOC
Gas Chromatograph 30	Agilent	7890	svcompav	30	US11521020	SVOC
Gas Chromatograph 31	Agilent	7890	svcompba	31	CN13503096	SVOC
Gas Chromatograph 32	Agilent	7890	svcompbc	32	CN14423060	SVOC
Gas Chromatograph 33	Agilent	7890	svcompbd	33	CN15033026	SVOC
Gas Chromatograph 34	Agilent	7890	svcompbe	34	CN15033027	SVOC
Gas Chromatograph Detectors 3	Detectors	NPD/NPD	svcompo	3	N/A	SVOC
Gas Chromatograph Detectors 7	Detectors	FID	svcompe	7	N/A	SVOC
Gas Chromatograph Detectors 8	Detectors	FID	svcompp	8	N/A	SVOC
Gas Chromatograph Detectors 9	Detectors	FID	svcompj	9	N/A	SVOC
Gas Chromatograph Detectors 10	Detectors	FID	svcompk	10	N/A	SVOC

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Semi-Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph Detectors 11	Detectors	ECD/ECD	svcompn	11	F) U11750 B) U12481	SVOC
Gas Chromatograph Detectors 12	Detectors	FPD/FPD	svcompo	12	N/A	SVOC
Gas Chromatograph Detectors 13	Detectors	FID	svcomps	13	N/A	SVOC
Gas Chromatograph Detectors 14	Detectors	ECD/ECD	svcompt	14	F) U3113 B) U2620	SVOC
Gas Chromatograph Detectors 16	Detectors	FID	svcompu	16	N/A	SVOC
Gas Chromatograph Detectors 17	Detectors	FID	svcompv	17	N/A	SVOC
Gas Chromatograph Detectors 18	Detectors	ECD/ECD	svcompd	18	F) U11613 B) U13988	SVOC
Gas Chromatograph Detectors 19	Detectors	ECD/ECD	svcompaa	19	F) U6632 B) U8422	SVOC
Gas Chromatograph Detectors 20	Detectors	ECD/ECD	svcompab	20	F) U13989 B) U0418	SVOC
Gas Chromatograph Detectors 21	Detectors	FID	svcompae	21	N/A	SVOC
Gas Chromatograph Detectors 22	Detectors	ECD/ECD	svcompaf	22	F)U12039 B) 12038	SVOC
Gas Chromatograph Detectors 23	Detectors	ECD/ECD	svcompag	23	F) U2621 B) U8104	SVOC
Gas Chromatograph Detectors 24	Detectors	ECD/ECD	svcompah	24	F) U8423 B) U12482	SVOC
Gas Chromatograph Detectors 26	Detectors	FID	svcompar	26	N/A	SVOC
Gas Chromatograph Detectors 27	Detectors	FID	svcompas	27	N/A	SVOC
Gas Chromatograph Detectors 28	Detectors	ECD/ECD	Svcompat	28	F) U26768 B) U26237	SVOC
Gas Chromatograph Detectors 29	Detectors	ECD/ECD	svcompau	29	F) U20277 B) U20299	SVOC
Gas Chromatograph Detectors 30	Detectors	ECD/ECD	svcompav	30	F) U20425 B) U20424	SVOC
Gas Chromatograph Detectors 31	Detectors	FID	svcompba	31	N/A	SVOC
Gas Chromatograph Detectors 32	Detectors	FID	svcompbc	32	N/A	SVOC
Gas Chromatograph Detectors 33	Detectors	FID	svcompbd	33	N/A	SVOC
Gas Chromatograph Detectors 34	Detectors	FID	svcompbe	34	N/A	SVOC
Gas Chromatograph/Mass Spectrometer 1	Agilent	6890 GC/5973MSD	svcompf	1	GC CN10335001 MS US33220022	SVOC
Gas Chromatograph/Mass Spectrometer 2	Agilent	6890 GC/5973MSD	svcompc	2	GC US10409048 MS US35120400	SVOC
Gas Chromatograph/Mass Spectrometer 4	Agilent	6890 GC/5973MSD	svcomph	4	GC CN10403067 MS US35120308	SVOC
Gas Chromatograph/Mass Spectrometer 7	Agilent	6890 GC/5973MSD	svcompm	7	GC ---------- MS US03940745	SVOC

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Semi-Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph/Mass Spectrometer 9	Agilent	6890 GC/5973MSD	svcompx	9	GC CN10344042 MS US33220158	SVOC
Gas Chromatograph/Mass Spectrometer 10	Agilent	6890 GC/5973MSD	svcompy	10	GC CN10340045 MS US33220183	SVOC
Gas Chromatograph/Mass Spectrometer 11	Agilent	6890 GC/5975MSD		11	GC CN10509031 MS US60532657	SVOC
Gas Chromatograph/Mass Spectrometer 12	Agilent	7890 GC/5975MSD	svcompai	12	GC CN10728074/ MS 12-0706-1325	SVOC
Gas Chromatograph/Mass Spectrometer 13	Agilent	7890 GC/5975MSD	svcompak	13	GC CN10301081/ MS US10313621	SVOC
Gas Chromatograph/Mass Spectrometer 14	Agilent	7890 GC/5975MSD	Svcompal	14	GC: CN11031022 MS: US11093726	SVOC
Gas Chromatograph/Mass Spectrometer 15	Agilent	7890 GC/5975MSD	Svcompam	15	GC: CN10301081 MS: US10313621	SVOC
Gas Chromatograph/Mass Spectrometer 16	Agilent	7890 GC/5975MSD	Svcompan	16	GC: CN10301152 MS: US10313616	SVOC
Gas Chromatograph/Mass Spectrometer 17	Agilent	7890 GC/5975MSD	Svcompao	17	GC: CN11191064 MS: US11363807	SVOC
Gas Chromatograph/Mass Spectrometer 18	Agilent	7890 GC/5975MSD	Svcompap	18	GC: CN11401093 MS: US11403903	SVOC
Gas Chromatograph/Mass Spectrometer 19	Agilent	7890 GC/5975MSD	Svcompaq	19	GC: CN11391051 MS: US11383838	SVOC
Gas Chromatograph/Mass Spectrometer 20	Agilent	7890 GC/5975MSD	Svcompaw	20	GC: CN12031161 MS: US11503941	SVOC
Gas Chromatograph/Mass Spectrometer 21	Agilent	7890 GC/5975MSD	Svcompax	21	GC: CN12031160 MS: US11513903	SVOC
Gas Chromatograph/Mass Spectrometer 22	Agilent	7890 GC/5975MSD	Svcompay	22	GC: CN11521157 MS: US12023909	SVOC
Gas Chromatograph/Mass Spectrometer 23	Agilent	7890 GC/5975MSD	Svcompaz	23	GC: CN12031114 MS: US11433926	SVOC
Gas Chromatograph/Mass Spectrometer 24	Agilent	7890 GC/5977MSD	Svcompbb	24	GC:CN10906031 MS: US11343905	SVOC
High Performance Liquid Chromatography	Agilent	1100 Series DAD/FLD	hplc1	1	DAD de01608402 FLD de23904489	SVOC
High Performance Liquid Chromatography	Agilent	1100 Series DAD/FLD	hplc2	2	DAD de30518420 FLD	SVOC
High Performance Liquid Chromatography (HPLC3)	Agilent	1100 Series DAD	hplc3	3	DAD us64400711	SVOC
High Performance Liquid Chromatography (HPLC4)	Agilent	1100 Series DAD/FLD	hplc4	4	DAD de43623013	SVOC
Analytical Balance	Mettler Toledo	PB1502-S		1	1126193668	Ext. Lab
Analytical Balance	Mettler Toledo	MS1602S		2	B243464732	Ext.Lab
Analytical Balance	Mettler Toledo	MS1602S		3	B115130112	Ext.Lab
Analytical Balance	Ohaus	ARA520		3	1202120618	Ext. Lab
Analytical Balance	Ohaus	ARA520		4	1202120814	Ext. Lab
Analytical Balance	Ohaus	Scout Pro			7132101108	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	1	2302	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	2	2304	Ext. Lab

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Semi-Volatiles Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Automatic Concentrators	Buchi	Syncore	Buchi	3	2303	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	4	0400000940	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	5	406583020005	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	6	1469	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	7	1461	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	8	417004020002	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	9	416870050003	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	10	1466	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	11	1463	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	12	1462	Ext. Lab
Automatic Concentrators	Buchi	Syncore	Buchi	13	1468	Ext. Lab
Capping station	Horizon	MARS X			snxc2225	Ext. Lab
Capping station	Horizon	MARS X			snxc2215	Ext. Lab
Centrifuge	Sorvall	ST-40		2	2224	Ext. Lab
Centrifuge	Sorvall	ST-40		3	2225	Ext. Lab
Centrifuge	Sorvall	ST-40		5	2227	Ext. Lab
Concentration Chiller	Lauda	UC0300			64593	Ext. Lab
Concentration Chiller	Lauda	WKL 3200			2039	Ext. Lab
Furnace	Thermo Scientific				1882	Ext. Lab
Oven	Fisher	6556			166	Ext. Lab
Oven	VWR	1305U			0520	Ext. Lab
HAA Shaker	Eberbach				2159	Ext. Lab
RV shaker	Eberbach	F6010.00			041242	Ext. Lab
RV shaker	Eberbach	F6010.00			041250	Ext. Lab
LVI Shaker	Eberbach	6010-04			1834	Ext. Lab
HAA water Bath	Thermo Scientific	280 series			2033602-102	Ext. Lab
High Intensity Ultrasonic Processor	Misonix			1	2193	Ext. Lab
High Intensity Ultrasonic Processor	Misonix			2	1382	Ext. Lab
High Intensity Ultrasonic Processor	Misonix			3	1888	Ext. Lab
High Intensity Ultrasonic Processor	Misonix			4	1381	Ext. Lab
Microwave	CEM	MARS 6		3	2296	Ext. Lab
Microwave	CEM	MARS 6		2	MJ2518	Ext. Lab
Microwave	CEM	MARS 6		4	MJ6367	Ext. Lab
OG concentrator	Horizon	SpeedVap III		1	1534	Ext. Lab
OG concentrator	Horizon	SpeedVap III		2	SN04-2020	Ext. Lab
OG concentrator	Horizon	SpeedVap III		3	2186	Ext. Lab
OG concentrator	Horizon	SpeedVap IV		1	15-0055	Wet Lab
OG concentrator	Horizon	SpeedVap IV		2	15-0056	Wet Lab

LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Semi-Volatiles Analysis ***This table is subject to revision without notice***						
Item	***Manufacturer***	***Model***	***Instrument Name***	***#***	***Serial #***	***Location***
OG SPE extractor	Horizon	SPE-DEX 3000		1	2222	Ext. Lab
OG SPE extractor	Horizon	SPE-DEX 3000		2	2223	Ext. Lab
OG SPE extractor	Horizon	SPE-DEX 3000		3	2221	Ext. Lab
OG SPE extractor	Horizon	SPE-DEX 3000		4	2220	Ext. Lab
OG SPE extractor	Horizon	SPE-DEX3100		1	15-0113	Wet Lab
OG SPE extractor	Horizon	SPE-DEX3100		2	15-0116	Wet Lab
OG SPE extractor	Horizon	SPE-DEX3100		3	15-0117	Wet Lab
OG SPE extractor	Horizon	SPE-DEX3100		4	15-0118	Wet Lab
OG SPE Controllers	Horizon	1000/3000XL		1	2125	Ext. Lab
OG SPE Controllers	Horizon	1000/3000XL		2	2659	Ext. Lab
OG SPE Controllers	Horizon	1000/3000XL		3	2127	Ext. Lab
OG SPE Controllers	Horizon	1000/3000XL		4	2128	Ext. Lab
Separatory funnel rotators	ATR				1514	Ext. Lab
Separatory funnel rotators	ATR				1515	Ext. Lab
Separatory funnel rotators	ATR				1516	Ext. Lab
Separatory funnel rotators	ATR				2055	Ext. Lab
Separatory funnel rotators	ATR				2056	Ext. Lab
Separatory funnel rotators	ATR				2057	Ext. Lab
Speed Vap	FMS				2471	Ext. Lab
Water Bath Sonicator	Branson	8510			RPA040384175E	Ext. Lab
Vacuum Pump	Gast				0908605639	Ext. Lab
Vacuum Pump	Gast				0913008139	Ext. Lab
Vacuum Pump	Gast			3	0311000841	Ext. Lab
Puck Mill/Shatterbox	SPEX	8530		1	10191	Ext. Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

INSTRUMENT	**P. M. DESCRIPTION**	**FREQUENCY**
Analytical Balances	•Check with Class "I" weights	Daily-tolerance ±0.1%
Analytical Balances	•Service/Calibration (semi-annual contract maintenance and calibration check)	Semi-annually
Refrigerators & Incubators	•Maintenance service	As needed determined by daily temperature performance checks
Gas Chromatograph Detectors: ECD	•Bake off or Replace •Perform wipe leakage test	GC/detector maintenance is routinely completed as needed for each instrument. Analysts are responsible for performing and documenting maintenance on each component of the instrumentation based on daily performance of the instrument and its
Gas Chromatograph Detectors: FID	•Change Quartz jet; clean; replace flame tip	
Gas Chromatograph/Mass Spectrometer	•Autotune Report	
Gas Chromatograph/Mass Spectrometer	•Clean ion source	

INSTRUMENT	P. M. DESCRIPTION	FREQUENCY
Gas Chromatograph/Mass Spectrometer	•Replace vacuum pump oil	ability to meet certain method requirements. Senior analyst team is available to help with major maintenance issues.
Gas Chromatographs/Mass Spectrometer & Gas Chromatographs	•Replace septa and liner	
Gas Chromatographs/Mass Spectrometer & Gas Chromatographs	•Replace column	
High Intensity Ultrasonic Processor - Misonix	•Check tuning criteria	Daily with use
Infrared Spectrophotometer - Foxboro Miran 1A	•Optics alignment or replacement	As needed when response begins to deteriorate

8.3 STANDARDS AND REAGENTS

Table 8.3A: Standard stock sources, description and calibration information.
This table is subject to revision without notice

Method	Vendor*	Description	Calibration	Storage Req.	Expiration
8310	Ultra	Aromatic Hydrocarbon	Primary	4° ± 2°C	6 months
	NSI	8310/610 Spike	Second Source	4° ± 2°C	6 months
DRO	NSI	DRO #2 Cal Mix	Primary	-10°C to –20°C	6 months
	NSI	DRO #2 Spike	Second Source	-10°C to –20°C	6 months
EPH TN DRO	NSI	TN-EPH Calibration Mix	Primary	-10°C to –20°C	6 months
	NSI	EPH-TN Spike	Second Source	-10°C to –20°C	6 months
RRO	NSI	30W Oil	Primary	-10°C to –20°C	6 months
PCB	Accustd	Aroclor PCB Kit	Primary	4° ± 2°C	6 months
	NSI	1260 Spike	Second Source	4° ± 2°C	6 months
Chlordane	Restek	Chlordane Mix	Primary	4° ± 2°C	6 months
Toxaphene	Restek	Toxaphene	Primary	4° ± 2°C	6 months
Pesticides	Ultra	Pest Mix	Primary	4° ± 2°C	6 months
	NSI	Pest Spike Mix	Second Source	4° ± 2°C	6 months
Herbicides	NSI	Custom Herbicide Mis	Primary	4° ± 2°C	6 months
	NSI	Herb Spike Mix	Second Source	4° ± 2°C	6 months
8141 OP Pest	Ultra/NSI	OP Cal Mix A, B	Primary	4° ± 2°C	6 months
	NSI	OP Spike Mix A, B	Second Source	4° ± 2°C	6 months
507 NP Pest	Ultra/NSI	507 Cal Mix	Primary	4° ± 2°C	2 months
	NSI	NP Pest Spike	Second Source	4° ± 2°C	2 months
THAA	Ultra/Accustd	HAA Cal Mix	Primary	-10°C to –20°C	6 months
	Accustd/NSI	HAA Spike	Second Source	-10°C to –20°C	6 months
8270	Ultra	Custom Std Mega Mix	Primary	4° ± 2°C	6 months
	Restek	Spike Mix	Second Source	4° ± 2°C	6 months
8330	Restek	Mix1, Mix2, PETN	Primary	4° ± 2°C	6 months
	Ultra, Chemservice	Mix1, Mix2, PETN	Second Source	4° ± 2°C	6 months
8011, 504.1	Accustd	504.1 Cal Mix	Primary	4° ± 2°C	1 month
	NSI	Spike Mix	Second Source	4° ± 2°C	1 month

Table 8.3A: Standard stock sources, description and calibration information.
This table is subject to revision without notice

Method	Vendor*	Description	Calibration	Storage Req.	Expiration
Sulfolane, 8270C	Sigma Aldrich	Calibration Mix	Primary	4° ± 2°C	6 months
	Restek	Spike Mix	Second source	4° ± 2°C	6 months
Glycol, 8015	Chemservice	Calibration Mix	Primary	4° ± 2°C	6 months
	Chemservice	Spike Mix	Second source	4° ± 2°C	6 months

**Equivalent Providers may be utilized.*

TABLE 8.3B: Working Standard Concentrations
This table is subject to revision without notice

Organic Compounds	Method #	Standard Concentrations	Storage Requirements	Expiration
Semi-Volatiles	625, SM6410B 20th, 8270C/D	1,2,4,8,12,16,20,30,40,50,80 (low level and regular)	4° ± 2°C	6 months
Semi-Volatiles: RV/LVI/NC SS	625, SM6410B 20th, 8270C/D	10,20,50,100,200,500,1000,2000 ug/L	4° ± 2°C	6 months
PCBs: 1L/RV SS	608, SM6431B 20th, 8082	2.0,4.0,5.0,10,20,50 µg/L	4° ± 2°C	6 months
Pesticides: 1L/RV/SS	608, SM 6630C, 8081A,	0.5,1.0,2.0,5.0,10,15,20 µg/L	4° ± 2°C	6 months
Chlordane and/or Toxaphene 1L/RV/SS	608, SM 6630C, 8081A,	10,20,50,100,150,200 µg/L	4° ± 2°C	6 months
Sulfolane	8270C/D	4,8,10,20,50,100,200,500 ug/L	4° ± 2°C	6 months
PCB Arochlors 1221, 1232, 1242, 1248, 1254	8082	10 ug/L	4° ± 2°C	6 months
Herbicides	8151A, SM6640C 20th	0.02, 0.05, 0.1, 0.2, 0.5, 1.0 mg/L	4° ± 2°C	6 months
OP and NP Pesticides	507 by dual-NPD, 1657A, 8141A by dual-FPD	0.2,1.0, 2.0, 5.0, 10.0, 15.0, 20.0 ug/L	4° ± 2°C	6 months
PAHs	8310, 610, SM6440B	0.04, 0.20,1.0,5.0,8.0,20.0,30.0, 40.0 ug/L	4° ± 2°C	6 months
PAHs: 1L/RV/LVI/ SS	8270C/D SIM	4.0,20,40,100,160,400,600,800 ug/L 1.0,5.0,10,20,40,80,200 ug/L	4° ± 2°C	6 months
Nitroaromatics & Nitramines	8330	.05, 0.1, 0.25, 0.5, 2.0, 5.0, 10.0, 25.0 mg/L	NA*	NA*
EPHTN	EPH TN	10000, 6000, 4000, 2000, 1000, 400, 200, 100 mg/L	NA*	NA*
DRO	OA2 , 8015Mod, LA TPH D, LA TPH O, OHIO DRO	10000, 5000, 3000, 2000, 1000, 400, 200, 100 mg/L	NA*	NA*
Diesel/M.O: RV/LVI	EPH TN OA2 ,	2.0,4.0,8.0,20,40,80,100,200	NA*	NA*

TABLE 8.3B: Working Standard Concentrations
This table is subject to revision without notice

Organic Compounds	Method #	Standard Concentrations	Storage Requirements	Expiration
	8015Mod, LA TPH D, LA TPH O, OHIO DRO	mg/L		
DRO	DRO/CA LUFT/CO	2.0,4.0,10,20,40,60,100,200 mg/L	NA*	NA*
DROMO: LVI PAHMO: LVI	MO DRO/PAH by 8270	5.0,10,20,40,80,120,160,200 mg/L 4.0,20,40,100,160,400,600,800 ug/L	4° ± 2°C	6 months
MADEP EPH	MADEP EPH	Aromatics C11-C22: 17, 85, 425, 850, 1700, 3400, 6800 mg/L Aliphatic C9 - C18: 6, 30, 150, 300, 600, 1200, 2400 mg/L Aliphatic C19 - C36: 8, 40, 200, 800, 1600, 3200 mg/L	NA*	NA*
EDB, DBCP, TCP	8011, 504.1	0.01, 0.02, 0.05, 0.10, 0.25, 0.5	NA*	NA*
THAAs	552.2	1, 2, 4, 10, 20, 30, 40, 50 ug/L	NA*	NA*
FL PRO	FL PRO	85, 850, 2550, 4250, 5950, 8500 mg/l	NA*	NA*
FL PRO RV	FL PRO	1.7, 3.4, 6.8, 13.6, 34, 85, 170 mg/L	NA*	NA-
Glycols	8015B/C/D - Modified	1.5,7.5,15,30,45,60 ppm	NA*	NA*
TX TPH	TX1005	Individual Ranges- 4.5, 10, 25, 50, 125, 250, 500, 1250, 2500 ppm. Total Range- 9.0, 20, 50, 100, 250, 500, 1000, 2500, 5000 ppm.	NA*	NA*

* indicates solutions are prepared fresh daily as needed.

8.4 INSTRUMENT CALIBRATION

608/8081A or B/SM6630C - Chlorinated Pesticides – SOP Number 330344

The gas chromatograph is calibrated using either the internal or external standard calibration model. A standard curve is prepared using a minimum of three concentration levels for each compound of interest for method 608. A minimum of five concentration levels is necessary for methods 8081A/B and SM6630C. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration or ISTD response for each compound and calibration/response factors are calculated. If performing analysis by method 608 and the response factors of the initial calibration are

< 10 % RSD for method 608 and 20% RSD for methods 8081A/B and 6630C over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990.

During the analytical sequence, the stability of the initial calibration curve is verified, following every 20th sample for external calibration and every 12 hours if monitoring ISTD, by the analysis of a continuing calibration verification (CCV) standard. The CCV must recover within 15% of the expected concentration for each analyte.
At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of initial calibration verification standard (ICV). If the response for any analyte in this check varies from the predicted response by more than ±15%, the analysis must be repeated using fresh standard. If the standard still does not meet the acceptance criteria, a new initial calibration curve must be generated.

An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should recover within ±20% of the expected concentration for each analyte. When analyte responses in field samples exceed the calibration range, the sample is diluted and re-analyzed.

Degradation if DDT and Endrin are also verified at least every 12hr window. Breakdown should recover less 20% of the total injection.

507 - Nitrogen/Phosphorus Pesticides - SOP Number 330348

The gas chromatograph is calibrated using the external standard procedure. A standard curve is prepared using a minimum of three concentration levels for each compound of interest for method 507. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are ≤20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990.

During the analytical sequence the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of a continuing calibration verification (CCV) standard. The CCV must recovery within 20% of the expected concentration for each analyte.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies by more than ±20% from the initial calibration, the analysis must be repeated using fresh standard. If the standard still does not meet the criteria, a new initial calibration curve must be generated.

A Quality Control Sample (QCS) is analyzed at a minimum quarterly to verify calibration standards.

552.2 - HAA - SOP Number 330319

The gas chromatograph is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of five concentration levels for each compound of interest. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are ≤20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990.

During the analytical sequence the stability of the initial calibration is verified, following every 10th sample and at the end of the sequence, by the analysis of a continuing calibration verification (CCV) standard. The response of the analytes in the CCV must not vary more than 30% from the initial calibration.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies by more than ±30% from the initial calibration, the analysis must be repeated using fresh standard. If the standard still does not meet the criteria, a new initial calibration curve must be analyzed.

A Quality Control Sample (QCS) is analyzed at a minimum quarterly to verify calibration standards.

8151A, SM6640B – Herbicides - SOP Number 330320

The gas chromatograph is calibrated using the external standard procedure. A standard curve is prepared using a minimum of five concentration levels for each analyte of interest. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within

detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are ≤20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990.

During the analytical sequence, the stability of the initial calibration is verified following every 10th sample and at the end of the sequence by the analysis of a continuing calibration verification (CCV) standard. The CCV must recovery within 15% of the expected concentration for each analyte for method 8151A and within 20% for method 6640C. The value of the CCV can exceed the criteria for a single compound provided that all samples in the analytical batch are BDL (below detection limit). The concentration of the continuing check standard must be routinely varied to verify the entire calibration range.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies from the predicted response by more than ±15%, the analysis must be repeated using fresh standard. If the standard still does not meet the criteria, a new initial calibration curve must be generated.

An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should recover within ±20% of the expected concentration for each analyte. When sample responses exceed the calibration range, the sample is diluted and re-analyzed.

8141A, 1657A – Organophosphorus Pesticides - SOP Number 330318

The gas chromatograph is calibrated using either the internal or external standard calibration model. A minimum of five concentration levels is necessary for methods 8141A and 1657A. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration or ISTD response for each compound and calibration/response factors are calculated. If the response factors of the initial calibration are ≤20 % RSD over the calibration range, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990.

During the analytical sequence, the stability of the initial calibration is verified following every 20th sample by the analysis of a continuing calibration verification (CCV) standard for external calibration or at the beginning of every 12hrs for ISTD calibration. The CCV must recovery within 15% of the expected concentration for each analyte. The concentration of the continuing check standard must be routinely varied to verify the entire calibration range.

At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies from the predicted response by more than ±15%, the analysis must be repeated using fresh standard. If the standard still does not meet the criteria, a new initial calibration curve must be generated. An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should recover within ±20% of the expected concentration for each analyte. When sample responses exceed the calibration range, the sample is diluted and re-analyzed.

625, 8270C or D, SM6410B - Base/Neutrals/Acids by GC/MS: Semivolatile Organics – SOP Number 330345

Detector mass calibration is performed using the autotune function of the GC/MS analytical system and PFTBA (Perfluorotributylamine). Following verification of the appropriate masses, the instrument sensitivity is verified by injecting a tuning solution containing decafluorotriphenylphosphine (DFTPP), benzidine, pentachlorophenol and DDT. The DFTPP must meet the ion abundance criteria specified by the EPA published method. Benzidine and pentachlorophenol are reviewed for tailing and DDT is reviewed for breakdown to DDE and DDD. Successful tuning must occur every 12 hours for method 8270C/D and every 24 hours for method 625, except where noted in the determinative SOP.

Following successful tuning, the GC/MS is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of three standards for method 625 and five standards for method 8270C/D and SM6410B. The calibration standards are tabulated according to peak height or area against concentration and the concentrations and responses of the internal standard analytes. The results are used to determine a response factor for each analyte in each standard injected. A calibration curve is the constructed and is determined to be acceptable if each analyte meets the criteria specified in the determinative method. When this condition is met, linearity through the origin can be assumed and the average RF can be used in place of a calibration curve. Initial calibration that does not meet these requirements will not be accepted and recalibration must be performed. Linear regression can be used for target compounds exceeding the 15% criteria, providing that the correlation coefficient is 0.990 or better. USACE projects must meet a correlation coefficient of 0.995 or better. The initial calibration range must represent the typical environmental sample and include the RL as the lowest calibration point. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range.

A second source calibration verification standard is analyzed after each calibration and should recover within 20% for all CCC compounds and within 50% for other analytes of interest for 8270C. All analytes must recover +/- 30% for 8270D. Following successful calibration, the analysis of field and QC samples may begin. Analysis may be performed only during the timeframe of a valid tuning cycle (12 hours for 8270C/D and 24 hours for 625). Following the expiration of the tuning clock, the instrument must be retuned and either re-calibrated or existing calibration may be re-verified.

For 8270C/D analyses, daily calibration verification includes successful demonstration of DFTPP sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest. The DFTPP tune must meet the ion abundance criteria specified within the published method. Each internal standard in the CCV must recover between -50% to + 100%, when compared to the same internal standard compound in the mid-point standard of the initial calibration curve. Additionally, if the retention time of an internal standard changes by more than 30 seconds from the retention time of the same internal standard in the mid-level standard of the most recent initial calibration, the system must be evaluated, corrected, and possibly re-calibrated.

For 625 analyses, daily calibration verification is accomplished by a successful demonstration of DFTPP sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest. The DFTPP tune must meet the same ion abundance criteria as the 8270C analysis and the CCV standard must recover within 20 % of predicted response for all analytes of interest.

8310, 610, SM6640B - PAHs by HPLC - SOP Number 330322

610: A standard curve is prepared using a minimum of three concentration levels for each compound of interest. If the response factors are < 10 % RSD over the working range, the average RF can be used for calculations

8310 & SM6640B: Perform calibration using a minimum of 5 points. If the response factors are < 20 % RSD over the working range, the average RF can be used for calculations or linear regression may be used providing that the correlation coefficient for each analyte of interest is 0.990 or better. USACE projects must meet a correlation coefficient of 0.995 or better. The regression line must never be forced through the origin.

The initial calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. Alternatively, the results can be used to plot a calibration curve of response ratios (Area/Ref. Area) vs (Amt./Ref Amt.). The calibration range must represent the typical environmental sample and include the RL as the lowest calibration point. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range. A second source calibration verification standard is analyzed after each calibration and should meet criteria of ±20%.

A continuing calibration verification (CCV) must be run at the beginning of each run and every 10 samples thereafter. The continuing calibration standard is prepared from the same source as the calibration curve and must perform within ±15% of the actual value. The CCV must represent the midpoint of the calibration range.

8330A/B/C – Nitroaromatics/Nitrosamines - SOP Number 330323

A standard curve is prepared using a minimum of five concentration levels for each compound of interest. Experience indicates that a linear calibration curve with zero intercept is appropriate for each analyte. Therefore, a response factor for each analyte can be taken as the slope of the best-fit regression line. The correlation coefficient for each analyte of interest is 0.990 or better. The calibration range must represent the typical environmental sample and include the RL as the lowest calibration point. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range. A second source calibration verification standard is analyzed after each calibration and should meet the criteria of ±20%.

Daily calibration is accomplished through the analysis of midpoint calibration standards, at a minimum, at the beginning of the day, and singly after the last sample of the day (assuming a sample group of 10 samples or less). Obtain the response factor for each analyte from the mean peak heights or peak areas and compare it with the response factor obtained for the initial calibration. The mean response factor for the daily calibration must agree within ±20% of the response factor of the initial calibration. If this requirement is not met, a new initial calibration must be obtained.

8015B/C/D or State Specific Method - DRO/RRO - Various SOPs

Certain state accreditation/registration programs may have specific requirements for calibration and analysis that must be met. Those requirements supersede the general guidance provided in this section and are addressed in the determinative SOP. Generally, for 8015B/C/D analysis, the gas chromatograph is calibrated using the external standard procedure. A standard curve is prepared using a minimum of five concentration levels for each analyte of interest. The calibration range must represent the typical environmental sample concentration and include the RL as the lowest calibration point. The linear range of the instrument must also be monitored to ensure that the maximum calibration point is within detection range. The calibration standards are tabulated according to peak height or area responses against concentration for each compound and response factors are calculated. If the response factors of the initial calibration are ≤20 % RSD over the calibration range, or per state method, the average RF can be used for calculations. Alternatively, when the response factor criteria is exceeded, the analyst may utilize a linear calibration model of response ratios (i.e. Area/Ref. Area or Amt./Ref Amt.) for quantitation providing that the correlation coefficient is at least 0.990. USACE projects must meet a correlation coefficient of 0.995 or better.

During the analytical sequence, the stability of the initial calibration is verified following every 10th or 20th sample depending on method and at the end of the sequence by the analysis of a continuing calibration verification (CCV) standard. Typically, the CCV must recovery within 15% of the expected concentration for each analyte for method 8015B/C/D; however state specific limits for the CCV may vary. See the specific SOP or published method for more guidance. The concentration of the continuing check standard must be routinely varied to verify the entire calibration range.
At daily instrument startup and in lieu of performing an entire initial calibration, the most recent calibration curve may be verified by the analysis of check calibration verification standard (CCV). If the response for any analyte in this check varies from the predicted response by more than ±15% of the expected concentration for each analyte for method 8015B/C/D or more than state specified limits, the analysis must be repeated using fresh standard. If the standard still does not meet the criteria, a new initial calibration curve must be generated.

An independent, or second source, calibration verification standard (SSCV) is analyzed after each initial calibration and should meet criteria of ±20% of the expected concentration for each analyte. When sample responses exceed the range of the standard curve, the sample is diluted to a concentration suspected to be within the calibration range and re-analyzed.

8.5 ACCEPTANCE/REJECTION OF CALIBRATION

Organic Chemistry

The initial calibration curve is compared with previous curves for the same analyte. All new standard curves are immediately checked with a secondary source or laboratory control standard prepared from a separate source than those used for calibration. All curves are visually reviewed to ensure that acceptable correlation represents linearity. Calibration curves may be rejected for nonlinearity, abnormal sensitivity, or poor response of the laboratory control standard.

Continuing calibration verification is performed on each day that initial calibration is not performed and following every 10th or 20th sample. If a check standard does not perform within established criteria then the instrument undergoes an evaluation to determine the cause. Once the issue is corrected, all samples between the last in control standard and the first out of control check are re-analyzed.

TABLE 8.5: INSTRUMENT CALIBRATION

Instrument (Analysis)	Calibration Type	Minimum Number of Standards	Type of Curve	Acceptance/ Rejection Criteria	Frequency
Gas Chromatography	Initial	3 (600 series methods) - 5 (other) cal.stds	Avg. RF or Linear	8081A, 8151A, 6640C, 8141A, 657A: Must be ≤20% RSD 608 - ≤10% RSD	As needed
	Second Source	1 Second Source		+/- 20% of true value	With each calibration

TABLE 8.5: INSTRUMENT CALIBRATION

Instrument (Analysis)	Calibration Type	Minimum Number of Standards	Type of Curve	Acceptance/ Rejection Criteria	Frequency
(Pest/PCB, Herbicides, Organophos/ Organonitrogen Pesticides)	Daily / Continuing	OPPEST/HERB1/10 P/PCB 1/20		Must be within 15% of the initial calibration curve, 20% for 6640C.	Beginning, every 20 samples and ending for external cal.
	Daily / Continuing	OPPEST/HERB1/10 P/PCB 1/20		Must be within 15% of the initial calibration curve, 20% for 6640C.	Every 12hrs samples for internal cal
HPLC (PAH and Explosive)	Initial	3 (600 series methods) 5 (other) cal.stds	Avg. RF or Linear	8310, 8330: Must be ≤20% RSD 610 - ≤10% RSD	As needed
	Second Source	1 Second Source		+/- 20% of true value	With each calibration
	Daily / Continuing	1/10		Must be within 15% of the initial calibration curve.	Beginning, every 10 and ending.
GC/MS Semi-volatiles 8270C/D	Initial	At least 5 cal. stds	Avg. RF or Linear	8270C - Must be ≤15% RSD, CCCs must be ≤ 30% RSD, Linear regression: 0.990 per method or 0.995 for USACE	As needed
	Second Source	1 Second Source		8270D - Must be ≤20% RSD for target analytes, Linear regression: 0.990 per method or 0.995 for USACE	With each calibration
				8270C: Should recover within 20% for all CCC compounds and within 50% for other analytes of interest, with the exception of analytes known to perform poorly 8270D: Should recover w/in 30% for all	
	Daily / Continuing	Tune & CCV		Must pass established method criteria. See SOP.	Every 12 hours per method
GC/MS Semi-volatiles 625	Initial	3 cal.stds	Avg. RF or Linear	625 - ≤35% RSD all compounds	As needed
	Second Source	1 Second Source		Should recover within 20% for all CCC compounds and within 50% for other analytes of interest, with the exception of analytes known to perform poorly	With each calibration
	Daily / Continuing	Tune & CCV every 24 hours		Must pass established method tuning criteria; 625: CCV must be ≤20% difference for all compounds,	Every 24 hours
HAA 552.2	Initial	5 cal.stds	Avg. RF or Linear	≤30% RSD all compounds	As needed
	Second Source(QCS)	1 Second Source		±30% of true value	Extracted with each batch
	Daily / Continuing	1/10		CCV must be ≤30% difference for all compounds,	Beginning, every 10 and ending

TABLE 8.5: INSTRUMENT CALIBRATION					
Instrument (Analysis)	**Calibration Type**	**Minimum Number of Standards**	**Type of Curve**	**Acceptance/ Rejection Criteria**	**Frequency**
Pesticides 507	Initial Second Source(QCS) Daily / Continuing	5 cal.stds 1 Second Source 1/10	Avg. RF or Linear	≤20% RSD all compounds ±20% of true value CCV must be ≤20% difference for all compounds,	As needed Extracted with each batch Beginning, every 10 and ending
DRO –8015, State Programs* * Or per state requirement	Initial Second Source Daily / Continuing	5 cal.stds 1 Second Source 1/10	Avg. RF or Linear	8015B/C/D - ≤20% RSD all compounds ±20% of true value CCV must be ≤15% difference for all compounds,	As needed With each calibration Beginning, every 10/20 and ending

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent grade water is obtained from an Evoqua resin with Aquafine UV system.

9.2 GLASSWARE WASHING AND STERILIZATION PROCEDURES

Organic laboratory glassware is washed in a non-phosphate detergent and warm tap water. Before washing, all writing and large deposits of grease are removed with acetone. Glassware is then rinsed with: tap water, "No Chromix" solution, tap water, and deionized (DI) water. It is then solvent rinsed in the following order: acetone, and then methylene chloride. Glassware is stored in designated drawers or on shelves, inverted if possible. All glassware is rinsed with the required solvent for the particular extraction protocol prior to use.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the semi-volatile laboratory can be found in the following table:

TABLE 10.1: SEMI-VOLATILE DEPARTMENT SOPS

This table is subject to revision without notice

SOP #	Title
	Preparatory SOPs
330702B	RV Separatory Funnel Liquid-Liquid Extraction 3510C
330702A	Separatory Funnel Liquid-Liquid Extraction 3510C MN
330702	Separatory Funnel Liquid-Liquid Extraction 3510C
330707	Microwave Extraction (3546)

SOP #	Title
330708	Buchi Syncore Concentration System
330709	Microextraction Procedure (3511)
330754	3580A Waste Dilution for SVOC's
330755	PCB in Oil Waste Dilution
Extract Cleanup SOPs	
330739	3630C Silica Gel Cleanup
330740	3665A Acid Clean up
330741	3660C Sulfur Clean up
330742	3620B Florisil Clean up
Semi-Volatiles Analysis SOPs	
330770A	TPH/O&G- Soxhlet extraction using Hexane
330771A	n-Hexane Oil and Grease Extraction by SPE for South Carolina
330771	n-Hexane Oil and Grease Extraction by SPE
330317	Sulfolane (Modified EPA Method 8270C/D)
330318	8141 Organophosphorus Pesticides
330319	THAA's
330320	Chlorinated Herbicides by Gas Chromatography (Method 8151A)
330322	8310 PAH's by HPLC
330323	8330 Explosives by HPLC
330343	8082 PCB's
330344	Pesticides and PCBS by Gas Chromatography (608 and 8081A)
330345	Semi-volatile Organics by GC/MS using Capillary Column
330346	8011/504.1 EDB in Drinking Water by GC ECD
330346OH	8011 EDB in Drinking Water by GC ECD
330348	507 NP Pesticides in Drinking Water by GC NPD
330350A	Diesel Range Organics/Total Petroleum Hydrocarbons (Diesel) By Gas Chromatography
330352	TN - Extractable Petroleum Hydrocarbons / KY- Diesel Range Organics
330353	MA Extractable Petroleum Hydrocarbons
330355	Florida Pro and CT ETPH
330356	TXTPH 1005/1006
330358	OA2 & NWTPHDx
330359	AK102/AK103
330360	DROWM
330361	Glycols by GC/FID (8015)

11.0 QUALITY CONTROL CHECKS

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

11.1 ESC participates in proficiency testing (PT's) in support of various laboratory accreditations/recognitions. Environmental samples are purchased from Environmental Resource Associates (ERA). The WS, WP and solid matrix studies are completed every 6 months. Proficiency testing samples are received and analyzed by method according to the vendor's instructions and according to the applicable analytical SOP.

11.2 Initial Demonstrations of Capability (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing

Demonstration of Capability (CDOCs) must be updated at least annually. The associated data is filed within the department and available for review.

11.3 Matrix Spike and Matrix Spike Duplicates are performed on each batch of samples analyzed depending on analytical method requested provided that sufficient volume is provided by the customer.

11.4 A Laboratory Control Sample (LCS) and LCS Duplicate are analyzed one per batch of samples.

11.5 A method preparation blank is performed per batch of samples processed. If the acceptance criteria as listed in the determinative SOP is exceeded, the laboratory shall evaluate whether re-processing of the samples is necessary, based on the following criteria:

- The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparation batch or
- The blank contamination is greater than 1/10 of the specified regulatory limit. The concentrations of common laboratory contaminants shall not exceed the reporting limit.

Any samples associated with a blank that fail these criteria shall be reprocessed in a subsequent preparation batch, except when the sample analysis resulted in non-detected results for the failing analytes.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in SOP #030201, *Data Handling and Reporting.* A secondary review of the data package is performed according to ESC SOP #030227, *Data Review*. The reviewer verifies that the analysis has been performed as required and meets method criteria, all associate data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required flags on test reports, etc.)

TABLE 12.1 Data Reduction Formulas

PARAMETER	FORMULA
GC and HPLC	response of sample analyte {*area*} x final extract volume {*mL*} x dilution response factor {*area/(mg/mL)*} x initial extract volume-mass {*mL or g*} *Calculations performed by HP Enviroquant Software*
GC/MS	response of analyte {*area*} x extract volume {*mL*} x dilution x int. std amt. {*area*} response factor {*area/(mg/mL)*} x initial volume-mass {*mL or g*} x int. std cal. {area} *Calculations performed by HP Enviroquant Software*

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.3 by method for current QC targets and controls and current reporting limits.

Marginal Excedence – When a large number of analytes exist in the LCS, it is statistically possible for a few analytes to be outside established control limits while the analytical system remains in control. These excursions must be random in nature and, if not, a review of the control limits or analytical process is necessary.

Upper and lower marginal excedence (ME) limits are established as the mean of at least 20 data points ± four times their standard deviations. The number of allowable marginal excedences per event is based on the number of analytes spiked in the LCS.

Allowable Marginal Exceedance per Event	
Analytes in LCS:	**ME Allowable**
>90	5
71-90	4
51-70	3
31-50	2
11-30	1
<11	0

Organic Control Limits - The organic QC targets are statutory in nature; warning and control limits for organic analyses are initially established for groups of compounds based on preliminary method validation data. When additional data becomes available, the QC targets are reviewed. All QC targets are routinely re-evaluated at least annually (and updated, if necessary) against laboratory historical data to insure that the limits continue to reflect realistic, method achievable goals.

12.3 REPORTING

Reporting procedures are documented in *SOP 030201 Data Handling and Reporting.*

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Pesticides	AZINPHOS-METHYL	8141A, 1657A	GW	64.9-120	20.0	0.001	mg/L
Pesticides	BOLSTAR (SULPROFOS)	8141A, 1657A	GW	65.4-119	20.0	0.001	mg/L
Pesticides	CHLORPYRIFOS	8141A, 1657A	GW	65.3-113	20.0	0.001	mg/L
Pesticides	COUMAPHOS	8141A, 1657A	GW	62.2-121	20.0	0.001	mg/L
Pesticides	DEMETON,-O AND -S	8141A, 1657A	GW	65.9-110	20.0	0.002	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Pesticides	DIAZINON	8141A, 1657A	GW	62.4-116	20.0	0.001	mg/L
Pesticides	DICHLORVOS	8141A, 1657A	GW	51.0-117	20.0	0.002	mg/L
Pesticides	DIMETHOATE	8141A, 1657A	GW	19.9-109	35.6	0.001	mg/L
Pesticides	DISULFOTON	8141A, 1657A	GW	63.3-113	20.0	0.001	mg/L
Pesticides	EPN	8141A, 1657A	GW	635-119	20.0	0.001	mg/L
Pesticides	ETHOPROP	8141A, 1657A	GW	63.7-113	20.0	0.001	mg/L
Pesticides	ETHYL PARATHION	8141A, 1657A	GW	71.8-112	20.0	0.001	mg/L
Pesticides	FENSULFOTHION	8141A, 1657A	GW	63.4-112	20.0	0.001	mg/L
Pesticides	FENTHION	8141A, 1657A	GW	61.5-114	20.0	0.001	mg/L
Pesticides	MALATHION	8141A, 1657A	GW	68.5-112	20.0	0.001	mg/L
Pesticides	MERPHOS	8141A, 1657A	GW	52.0-115	20.0	0.001	mg/L
Pesticides	METHYL PARATHION	8141A, 1657A	GW	70.6-114	20.0	0.001	mg/L
Pesticides	MEVINPHOS	8141A, 1657A	GW	58.8-111	20.0	0.001	mg/L
Pesticides	NALED	8141A, 1657A	GW	60.7-112	20.0	0.001	mg/L
Pesticides	PHORATE	8141A, 1657A	GW	64.1-113	20.0	0.001	mg/L
Pesticides	RONNEL	8141A, 1657A	GW	63.0-112	20.0	0.001	mg/L
Pesticides	STIROPHOS	8141A, 1657A	GW	65.3-118	20.0	0.001	mg/L
Pesticides	SULFOTEP	8141A, 1657A	GW	64.7-110	20.0	0.001	mg/L
Pesticides	TEPP	8141A, 1657A	GW	34.3-107	31.3	0.020	mg/L
Pesticides	TOKUTHION (PROTHIOFOS)	8141A, 1657A	GW	62.9-118	20.0	0.001	mg/L
Pesticides	TRICHLORONATE	8141A, 1657A	GW	67.1-112	20.0	0.001	mg/L
Pesticides	AZINPHOS-METHYL	8141A	SS	63.3-118	20.0	0.1	mg/Kg
Pesticides	BOLSTAR (SULPROFOS)	8141A	SS	67.3-119	20.0	0.1	mg/Kg
Pesticides	CHLORPYRIFOS	8141A	SS	67.1-117	20.0	0.1	mg/Kg
Pesticides	COUMAPHOS	8141A	SS	64.4-122	20.0	0.1	mg/Kg
Pesticides	DEMETON,-O AND -S	8141A	SS	60.9-111	20.0	0.1	mg/Kg
Pesticides	DIAZINON	8141A	SS	27.8-141	21.7	0.1	mg/Kg
Pesticides	DICHLORVOS	8141A	SS	43.8-117	20.0	0.1	mg/Kg
Pesticides	DIMETHOATE	8141A	SS	43.7-115	23.2	0.1	mg/Kg
Pesticides	DISULFOTON	8141A	SS	67.7-114	20.0	0.1	mg/Kg
Pesticides	EPN	8141A	SS	58.0-120	20.0	0.1	mg/Kg
Pesticides	ETHOPROP	8141A	SS	70.9-114	20.0	0.1	mg/Kg
Pesticides	ETHYL PARATHION	8141A	SS	66.0-115	20.0	0.1	mg/Kg
Pesticides	FENSULFOTHION	8141A	SS	41.1-121	24.9	0.1	mg/Kg
Pesticides	FENTHION	8141A	SS	63.8-119	20.0	0.1	mg/Kg
Pesticides	MALATHION	8141A	SS	66.9-117	20.0	0.1	mg/Kg
Pesticides	MERPHOS	8141A	SS	63.8-117	20.0	0.1	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Pesticides	METHYL PARATHION	8141A	SS	67.6-113	20.0	0.1	mg/Kg
Pesticides	MEVINPHOS	8141A	SS	49.7-120	20.0	0.1	mg/Kg
Pesticides	NALED	8141A	SS	17.4-116	25.9	0.1	mg/Kg
Pesticides	PHORATE	8141A	SS	67.03-114	20.0	0.1	mg/Kg
Pesticides	RONNEL	8141A	SS	66.3-113	20.0	0.1	mg/Kg
Pesticides	STIROPHOS	8141A	SS	66.1-113	20.0	0.1	mg/Kg
Pesticides	SULFOTEP	8141A	SS	67.8-117	20.0	0.1	mg/Kg
Pesticides	TEPP	8141A	SS	0-79	40.0	1.0	mg/Kg
Pesticides	TOKUTHION (PROTHIOFOS)	8141A	SS	67.2-118	20.0	0.1	mg/Kg
Pesticides	TRICHLORONATE	8141A	SS	65.4-121	20.0	0.1	mg/Kg
Pesticides	ALACHLOR	507	DW	70.0-130	25.0	0.0002	mg/L
Pesticides	ATRAZINE	507	DW	70.0-130	25.0	0.0001	mg/L
Pesticides	BUTACHLOR	507	DW	70.0-130	25.0	0.0001	mg/L
Pesticides	METOLACHLOR	507	DW	70.0-130	25.0	0.0002	mg/L
Pesticides	METRIBUZIN	507	DW	70.0-130	25.0	0.0002	mg/L
Pesticides	SIMAZINE	507	DW	70.0-130	25.0	7.00E-05	mg/L
Pesticides	4,4-DDD	608/8081A/B, 6630C	GW, WW	63.0-130	20.0	0.00005	mg/L
Pesticides	4,4-DDE	608/8081A/B, 6630C	GW, WW	59.3-125	20.0	0.00005	mg/L
Pesticides	4,4-DDT	608/8081A/B, 6630C	GW, WW	61.3-130	20.0	0.00005	mg/L
Pesticides	ALDRIN	608/8081A/B, 6630C	GW, WW	39.0-123	20.0	0.00005	mg/L
Pesticides	ALPHA BHC	608/8081A/B, 6630C	GW, WW	60.1-128	20.0	0.00005	mg/L
Pesticides	BETA BHC	608/8081A/B, 6630C	GW, WW	59.2-135	20.0	0.00005	mg/L
Pesticides	ALPHA CHLORDANE	608/8081A/B, 6630C	GW, WW	63.7-132	20.0	0.005	mg/L
Pesticides	DELTA BHC	608/8081A/B, 6630C	GW, WW	61.8-131	20.0	0.00005	mg/L
Pesticides	DIELDRIN	608/8081A/B, 6630C	GW, WW	61.4-130	20.0	0.00005	mg/L
Pesticides	ENDOSULFAN I	608/8081A/B, 6630C	GW, WW	61.8-131	20.0	0.00005	mg/L
Pesticides	ENDOSULFAN II	608/8081A/B, 6630C	GW, WW	54.8-138	20.0	0.00005	mg/L
Pesticides	ENDOSULFAN SULFATE	608/8081A/B, 6630C	GW, WW	61.9-139	20.0	0.00005	mg/L
Pesticides	ENDRIN	608/8081A/B, 6630C	GW, WW	53.8-125	20.0	0.00005	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Pesticides	ENDRIN ALDEHYDE	608/8081A/B, 6630C	GW, WW	63.0-129	20.0	0.00005	mg/L
Pesticides	ENDRIN KETONE	608/8081A/B, 6630C	GW, WW	61.3-129	20.0	0.00005	mg/L
Pesticides	GAMMA BHC	608/8081A/B, 6630C	GW, WW	43.3-123	20.0	0.00005	mg/L
Pesticides	HEPTACHLOR	608/8081A/B, 6630C	GW, WW	61.8-130	20.0	0.00005	mg/L
Pesticides	HEPTACHLOR EPOXIDE	608/8081A/B, 6630C	GW, WW	48.3-110	20.0	0.00005	mg/L
Pesticides	HEXACHLOROBENZENE	608/8081A/B, 6630C	GW, WW	48.3-110	20.0	0.00005	mg/L
Pesticides	METHOXYCHLOR	608/8081A/B, 6630C	GW, WW	62.1-135	20.0	0.00005	mg/L
PCBs	PCB 1016	608, 6431B, 8082/A	GW, WW	55.5-103	20.0	0.0005	mg/L
PCBs	PCB 1260	608, 6431B, 8082/A	GW, WW	51.2-111	22.0	0.0005	mg/L
PCBs	PCB 1016	8082/A	SS	46.3-117	27.5	0.017	mg/Kg
PCBs	PCB 1260	8082/A	SS	46.5-120	27.0	0.017	mg/Kg
Pesticides	4,4-DDD	8081A/B	SS	70.8-120	20.0	0.02	mg/Kg
Pesticides	4,4-DDE	8081A/B	SS	70.9-121	20.0	0.02	mg/Kg
Pesticides	4,4-DDT	8081A/B	SS	68.1-124	20.0	0.02	mg/Kg
Pesticides	ALDRIN	8081A/B	SS	71.1-120	20.0	0.02	mg/Kg
Pesticides	ALPHA BHC	8081A/B	SS	69.9-121	20.0	0.02	mg/Kg
Pesticides	BETA BHC	8081A/B	SS	69.6-121	20.0	0.02	mg/Kg
Pesticides	DELTA BHC	8081A/B	SS	68.1-127	20.0	0.02	mg/Kg
Pesticides	DIELDRIN	8081A/B	SS	71.3-122	20.0	0.02	mg/Kg
Pesticides	ENDOSULFAN I	8081A/B	SS	71.6-122	20.0	0.02	mg/Kg
Pesticides	ENDOSULFAN II	8081A/B	SS	71.1-120	20.0	0.02	mg/Kg
Pesticides	ENDOSULFAN SULFATE	8081A/B	SS	67.4-125	20.0	0.02	mg/Kg
Pesticides	ENDRIN	8081A/B	SS	69.6-126	20.0	0.02	mg/Kg
Pesticides	ENDRIN ALDEHYDE	8081A/B	SS	59.9-114	20.0	0.02	mg/Kg
Pesticides	ENDRIN KETONE	8081A/B	SS	70.8-122	20.0	0.02	mg/Kg
Pesticides	GAMMA BHC	8081A/B	SS	70.1-121	20.0	0.02	mg/Kg
Pesticides	HEPTACHLOR	8081A/B	SS	63.3-126	20.0	0.02	mg/Kg
Pesticides	HEPTACHLOR EPOXIDE	8081A/B	SS	71.9-121	20.0	0.02	mg/Kg
Pesticides	HEXACHLOROBENZENE	8081A/B	SS	62.7-117	20.0	0.02	mg/Kg
Pesticides	METHOXYCHLOR	8081A/B	SS	69.3-122	20.0	0.02	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Herbicides	2,4,5-T	1658, 8151A, 6640C	GW, WW	50.0-121	26.5	0.002	mg/L
Herbicides	2,4,5-TP (SILVEX)	1658, 8151A, 6640C	GW, WW	46.3-127	29.5	0.002	mg/L
Herbicides	2,4-D	1658, 8151A, 6640C	GW, WW	31.1-136	28.6	0.002	mg/L
Herbicides	2,4-DB	1658, 8151A, 6640C	GW, WW	39.5-128	31.9	0.002	mg/L
Herbicides	DALAPON	1658, 8151A, 6640C	GW, WW	36.6-132	29.2	0.002	mg/L
Herbicides	DICAMBA	1658, 8151A, 6640C	GW, WW	53.7-134	20.0	0.002	mg/L
Herbicides	DICHLOROPROP	1658, 8151A, 6640C	GW, WW	42.5-109	26.8	0.002	mg/L
Herbicides	DINOSEB	1658, 8151A, 6640C	GW, WW	42.5-112	21.3	0.002	mg/L
Herbicides	MCPA	1658, 8151A, 6640C	GW, WW	30.5-137	31.4	0.1	mg/L
Herbicides	MCPP	1658, 8151A, 6640C	GW, WW	33.2-148	25.2	0.1	mg/L
Herbicides	PENTACHLOROPHENOL	1658, 8151A, 6640C	GW	60-140	20	.001	mg/L
Herbicides	2,4,5-T	8151A	SS	44.9-111	21.5	0.07	mg/Kg
Herbicides	2,4,5-TP (SILVEX)	8151A	SS	48.4-110	25.9	0.07	mg/Kg
Herbicides	2,4-D	8151A	SS	40.0-112	24.8	0.07	mg/Kg
Herbicides	2,4-DB	8151A	SS	33.8-126	27.8	0.07	mg/Kg
Herbicides	DALAPON	8151A	SS	36.7-119	28.0	0.07	mg/Kg
Herbicides	DICAMBA	8151A	SS	50.2-125	20.0	0.07	mg/Kg
Herbicides	DICHLOROPROP	8151A	SS	39.9-99.0	20.1	0.07	mg/Kg
Herbicides	DINOSEB	8151A	SS	15.6-109	40.0	0.07	mg/Kg
Herbicides	MCPA	8151A	SS	34.7-110	31.7	6.5	mg/Kg
Herbicides	MCPP	8151A	SS	41.0-121	24.9	6.5	mg/Kg
PAH	PYRENE	8310, 610, 6440B	GW, WW	69.2-96.9	20.0	0.00001	mg/L
PAH	PHENANTHRENE	8310, 610, 6440B	GW, WW	66.5-95.7	20.0	0.00001	mg/L
PAH	NAPHTHALENE	8310, 610, 6440B	GW, WW	47.5-86.6	20.2	0.001	mg/L
PAH	INDENO(1,2,3-CD)PYRENE	8310, 610, 6440B	GW, WW	52.4-104	20.0	0.00001	mg/L
PAH	FLUORENE	8310, 610, 6440B	GW, WW	55.3-98.8	20.0	0.00001	mg/L
PAH	FLUORANTHENE	8310, 610,	GW, WW	70.4-102	20.0	0.00001	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
		6440B					
PAH	DIBENZ(A,H)ANTHRACENE	8310, 610, 6440B	GW, WW	38.6-111	22.2	0.000005	mg/L
PAH	CHRYSENE	8310, 610, 6440B	GW, WW	72.9-107	20.0	0.00001	mg/L
PAH	BENZO(K)FLUORANTHENE	8310, 610, 6440B	GW, WW	67.3-102	20.0	0.00001	mg/L
PAH	BENZO(G,H,I)PERYLENE	8310, 610, 6440B	GW, WW	41.9-115	20.0	0.00001	mg/L
PAH	BENZO(B)FLUORANTHENE	8310, 610, 6440B	GW, WW	68.5-102	20.0	0.00001	mg/L
PAH	BENZO(A)PYRENE	8310, 610, 6440B	GW, WW	58..8-106	20.0	0.00001	mg/L
PAH	BENZO(A)ANTHRACENE	8310, 610, 6440B	GW, WW	72.4-102	20.0	0.00001	mg/L
PAH	ANTHRACENE	8310, 610, 6440B	GW, WW	68.8-99.3	20.0	0.00001	mg/L
PAH	ACENAPHTHYLENE	8310, 610, 6440B	GW, WW	59.4-91.9	20.0	0.00001	mg/L
PAH	ACENAPHTHENE	8310, 610, 6440B	GW, WW	57.0-89.5	20.0	0.00001	mg/L
PAH	2-METHYLNAPHTHALENE	8310, 610, 6440B	GW, WW	45.7-92.1	20.0	0.001	mg/L
PAH	1-METHYLNAPHTHALENE	8310, 610, 6440B	GW, WW	54.6-104	20.0	0.001	mg/L
PAH	PYRENE	8310	SS	71.9-100	20.0	0.02	mg/Kg
PAH	PHENANTHRENE	8310	SS	66.9-97.1	20.0	0.02	mg/Kg
PAH	NAPHTHALENE	8310	SS	52..0-94.2	20.0	0.02	mg/Kg
PAH	INDENO(1,2,3-CD)PYRENE	8310	SS	64.6-101	20.0	0.02	mg/Kg
PAH	FLUORENE	8310	SS	58.6-100	20.0	0.02	mg/Kg
PAH	FLUORANTHENE	8310	SS	73.4-103	20.0	0.02	mg/Kg
PAH	DIBENZ(A,H)ANTHRACENE	8310	SS	72.1-100	20.0	0.02	mg/Kg
PAH	CHRYSENE	8310	SS	77.3-107	20.0	0.02	mg/Kg
PAH	BENZO(K)FLUORANTHENE	8310	SS	73.3-102	20.0	0.02	mg/Kg
PAH	BENZO(G,H,I)PERYLENE	8310	SS	67.1-110	20.0	0.02	mg/Kg
PAH	BENZO(B)FLUORANTHENE	8310	SS	73.9-103	20.0	0.02	mg/Kg
PAH	BENZO(A)PYRENE	8310	SS	66.5-104	20.0	0.02	mg/Kg
PAH	BENZO(A)ANTHRACENE	8310	SS	77.7-102	20.0	0.02	mg/Kg
PAH	ANTHRACENE	8310	SS	71.9-101	20.0	0.02	mg/Kg
PAH	ACENAPHTHYLENE	8310	SS	59.5-98.4	20.0	0.02	mg/Kg
PAH	ACENAPHTHENE	8310	SS	58.6-95.5	20.0	0.02	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
PAH	2-METHYLNAPHTHALENE	8310	SS	54.9-95.3	20.0	0.02	mg/Kg
PAH	1-METHYLNAPHTHALENE	8310	SS	62.3-110	20.0	0.02	mg/Kg
BNA	PYRIDINE	8270C/D 625	GW,WW	13.0-54.0	32.8	0.01	mg/L
BNA	PYRENE	8270C/D 625	GW,WW	40.2-135	20.0	0.0002	mg/L
BNA	PHENOL	8270C/D 625	GW,WW	10.0-77.3	24.6	0.01	mg/L
BNA	PHENANTHRENE	8270C/D 625	GW,WW	41.4-134	20.0	0.0002	mg/L
BNA	PENTACHLOROPHENOL	8270C/D 625	GW,WW	17.0-117	34.3	0.001	mg/L
BNA	N-OCTADECANE	8270C/D 625	GW,WW	28.3-151	20.0	0.01	mg/L
BNA	N-NITROSODIPHENYLAMINE	8270C/D 625	GW,WW	41.1-134	20.0	0.01	mg/L
BNA	N-NITRODIPHENYLAMINE	8270C/D 625	GW,WW	40.1-157	20.0	0.01	mg/L
BNA	N-NITROSODI-N-PROPYLAMINE	8270C/D 625	GW,WW	35.6-125	20.0	0.01	mg/L
BNA	N-NITROSODIMETHYLAMINE	8270C/D 625	GW,WW	12.3-70.5	33.0	.01	mg/L
BNA	NITROBENZENE	8270C/D 625	GW,WW	34.4-121	21.2	.01	mg/L
BNA	N-DECANE	8270C/D 625	GW,WW	10.0-118	32.3	0.01	mg/L
BNA	NAPHTHALENE	8270C/D 625	GW,WW	33.0-117	20.0	0.001	mg/L
BNA	ISOPHORONE	8270C/D 625	GW,WW	30.5-109	20.0	0.01	mg/L
BNA	INDENO(1,2,3-CD)PYRENE	8270C/D 625	GW,WW	41.0-140	20.0	0.0002	mg/L
BNA	HEXACHLOROETHANE	8270C/D 625	GW,WW	22.2-109	25.8	0.01	mg/L
BNA	HEXACHLOROCYCLOPENTADIENE	8270C/D 625	GW,WW	13.5-122	21.6	0.01	mg/L
BNA	HEXACHLOROBENZENE	8270C/D 625	GW,WW	34.1-125	20.0	0.001	mg/L
BNA	HEXACHLORO-1,3-BUTADIENE	8270C/D 625	GW,WW	24.9-121	22.0	0.01	mg/L
BNA	FLUORENE	8270C/D 625	GW,WW	39.9-132	20.0	0.0002	mg/L
BNA	FLUORANTHENE	8270C/D 625	GW,WW	41.4-141	20.0	0.0002	mg/L
BNA	DI-N-OCTYL PHTHALATE	8270C/D 625	GW,WW	39.8-146	20.0	0.003	mg/L
BNA	DI-N-BUTYL PHTHALATE	8270C/D 625	GW,WW	33.0-151	20.0	0.003	mg/L
BNA	DIMETHYL PHTHALATE	8270C/D 625	GW,WW	23.4-138	20.2	0.003	mg/L
BNA	DIETHYL PHTHALATE	8270C/D 625	GW,WW	36.0-140	20.0	0.003	mg/L
BNA	DIBENZOFURAN	8270C/D 625	GW,WW	37.9-128	20.0	0.01	mg/L
BNA	DIBENZ(A,H)ANTHRACENE	8270C/D 625	GW,WW	39.9-141	20.0	0.0002	mg/L
BNA	CHRYSENE	8270C/D 625	GW,WW	40.5-140	20.0	0.0002	mg/L
BNA	CARBAZOLE	8270C/D 625	GW,WW	41.0-137	20.0	0.01	mg/L
BNA	CAPROLACTAM	8270C/D 625	GW,WW	10.0-45.6	25.2	0.01	mg/L
BNA	BIS(2-ETHYLHEXYL)PHTHALATE	8270C/D 625	GW,WW	41.4-150	20.0	0.003	mg/L
BNA	BIS(2-CHLOROISOPROPYL)ETHER	8270C/D 625	GW,WW	33.6-115	21.3	0.01	mg/L
BNA	BIS(2-CHLOROETHYL)ETHER	8270C/D 625	GW,WW	29.8-114	25.3	0.01	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	BIS(2-CHLORETHOXY)METHANE	8270C/D 625	GW,WW	36.7-123	20.0	0.01	mg/L
BNA	BIPHENYL	8270C/D 625	GW,WW	36.9-126	20.0	0.01	mg/L
BNA	BENZYLBUTYL PHTHALATE	8270C/D 625	GW,WW	29.2-146	20.7	0.003	mg/L
BNA	BENZYL ALCOHOL	8270C/D 625	GW,WW	26.0-104	21.0	0.01	mg/L
BNA	BENZOIC ACID	8270C/D 625	GW,WW	10.0-54.3	40.0	0.05	mg/L
BNA	BENZO(K)FLUORANTHENE	8270C/D 625	GW,WW	41.5-140	20.0	0.0002	mg/L
BNA	BENZO(G,H,I)PERYLENE	8270C/D 625	GW,WW	38.8-137	20.0	0.0002	mg/L
BNA	BENZO(B)FLUORANTHENE	8270C/D 625	GW,WW	40.5-137	20.0	0.0002	mg/L
BNA	BENZO(A)PYRENE	8270C/D 625	GW,WW	41.7-138	20.0	0.0002	mg/L
BNA	BENZO(A)ANTHRACENE	8270C/D 625	GW,WW	42.3-137	20.0	0.0002	mg/L
BNA	BENZIDINE	8270C/D 625	GW,WW	10.0-75.5	40.0	0.05	mg/L
BNA	BENZALDEHYDE	8270C/D 625	GW,WW	10.0-93.4	27.8	0.01	mg/L
BNA	AZOBENZENE	8270C/D 625	GW,WW	37.2-129	20.0	0.01	mg/L
BNA	ATRAZINE	8270C/D 625	GW,WW	40.6-154	20.0	0.01	mg/L
BNA	ANTHRACENE	8270C/D 625	GW,WW	42.9-138	20.0	0.001	mg/L
BNA	ANILINE	8270C/D 625	GW,WW	22.5-99.1	28.3	0.01	mg/L
BNA	ACETOPHENONE	8270C/D 625	GW,WW	35.6-122	20.0	0.01	mg/L
BNA	ACENAPHTHYLENE	8270C/D 625	GW,WW	41.0-135	20.0	0.0002	mg/L
BNA	ACENAPHTHENE	8270C/D 625	GW,WW	39.0-128	20.0	0.0002	mg/L
BNA	4-NITROPHENOL	8270C/D 625	GW,WW	10.0-65.4	33.6	0.01	mg/L
BNA	4-NITROANILINE	8270C/D 625	GW,WW	37.3-159	20.0	0.01	mg/L
BNA	4-CHLOROPHENYL-PHENYLETHER	8270C/D 625	GW,WW	37.3-130	20.0	0.01	mg/L
BNA	4-CHLOROANILINE	8270C/D 625	GW,WW	29.8-128	20.9	0.01	mg/L
BNA	4-CHLORO-3-METHYLPHENOL	8270C/D 625	GW,WW	34.6-130	20.0	0.01	mg/L
BNA	4-BROMOPHENYL-PHENYLETHER	8270C/D 625	GW,WW	39.0-137	20.0	0.01	mg/L
BNA	4,6-DINITRO-2-METHYLPHENOL	8270C/D 625	GW,WW	28.2-134	29.2	0.01	mg/L
BNA	3-NITROANILINE	8270C/D 625	GW,WW	34.8-132	20.0	0.01	mg/L
BNA	3,3-DICHLOROBENZIDINE	8270C/D 625	GW,WW	33.1-134	20.0	0.01	mg/L
BNA	3&4-METHYLPHENOL	8270C/D 625	GW,WW	23.1-107	20.7	0.01	mg/L
BNA	2-NITROPHENOL	8270C/D 625	GW,WW	38.3-125	20.0	0.01	mg/L
BNA	2-NITROANILINE	8270C/D 625	GW,WW	41.9-143	20.0	0.01	mg/L
BNA	2-METHYLPHENOL	8270C/D 625	GW,WW	23.9-97	20.0	0.01	mg/L
BNA	2-METHYLNAPHTHALENE	8270C/D 625	GW,WW	35.6-124	20.0	0.001	mg/L
BNA	2-CHLOROPHENOL	8270C/D 625	GW,WW	31.2-103	20.0	0.01	mg/L
BNA	2-CHLORONAPHTHALENE	8270C/D 625	GW,WW	35.1-123	20.0	0.001	mg/L
BNA	2,6-DINITROTOLUENE	8270C/D 625	GW,WW	41.0-139	20.0	0.01	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	2,4-DINITROTOLUENE	8270C/D 625	GW,WW	42.3-143	20.0	0.01	mg/L
BNA	2,4-DINITROPHENOL	8270C/D 625	GW,WW	10.0-108	40.0	0.01	mg/L
BNA	2,4-DIMETHYLPHENOL	8270C/D 625	GW,WW	33.8-126	20.0	0.01	mg/L
BNA	2,4-DICHLOROPHENOL	8270C/D 625	GW,WW	39.6-121	20.0	0.01	mg/L
BNA	2,4,6-TRICHLOROPHENOL	8270C/D 625	GW,WW	35.9-129	22.4	0.01	mg/L
BNA	2,4,5-TRICHLOROPHENOL	8270C/D 625	GW,WW	35.4-136	20.0	0.01	mg/L
BNA	1-METHYLNAPHTHALENE	8270C/D 625	GW,WW	34.3-123	20.0	0.001	mg/L
BNA	1,4-DICHLOROBENZENE	8270C/D 625	GW,WW	24.8-105	25.2	0.01	mg/L
BNA	1,3-DICHLOROBENZENE	8270C/D 625	GW,WW	23.9-103	25.2	0.01	mg/L
BNA	1,2-DICHLOROBENZENE	8270C/D 625	GW,WW	26.1-107	25.4	0.01	mg/L
BNA	1,2,4-TRICHLOROBENZENE	8270C/D 625	GW,WW	26.6-109	20.0	0.01	mg/L
BNA	1,2,4,5-TETRACHLOROBENZENE	8270C/D 625	GW,WW	30.8-124	20.7	0.01	mg/L
BNA	PYRIDINE	8270C/D	SS	10.0-90.0	38.3	0.33	mg/Kg
BNA	PYRENE	8270C/D	SS	47.1-108	20.0	0.33	mg/Kg
BNA	PHENOL	8270C/D	SS	41.5-106	20.0	0.33	mg/Kg
BNA	PHENANTHRENE	8270C/D	SS	51.6-107	20.0	0.33	mg/Kg
BNA	PENTACHLOROPHENOL	8270C/D	SS	16.2-102	22.9	0.33	mg/Kg
BNA	N-OCTADECANE	8270C/D	SS	40.7-122	20.0	0.33	mg/Kg
BNA	N-NITROSODIPHENYLAMINE	8270C/D	SS	48.8-107	20.0	0.33	mg/Kg
BNA	N-NITROSODI-N-PROPYLAMINE	8270C/D	SS	43.3-109	20.0	0.33	mg/Kg
BNA	N-NITROSODIMETHYLAMINE	8270C/D	SS	18.1-1422	23.5	0.33	mg/Kg
BNA	NITROBENZENE	8270C/D	SS	40.7-109	21.0	0.33	mg/Kg
BNA	N-DECANE	8270C/D	SS	38.1-116	20.0	0.33	mg/Kg
BNA	NAPHTHALENE	8270C/D	SS	43.4-103	20.0	0.33	mg/Kg
BNA	ISOPHORONE	8270C/D	SS	28.8-104	20.0	0.033	mg/Kg
BNA	INDENO(1,2,3-CD)PYRENE	8270C/D	SS	47.5-109	20.0	0.33	mg/Kg
BNA	HEXACHLOROETHANE	8270C/D	SS	36.2-103	22.7	0.033	mg/Kg
BNA	HEXACHLOROCYCLOPENTADIENE	8270C/D	SS	13.5-123	20.7	0.33	mg/Kg
BNA	HEXACHLOROBENZENE	8270C/D	SS	43.2-104	20.1	0.33	mg/Kg
BNA	HEXACHLORO-1,3-BUTADIENE	8270C/D	SS	41.5-112	20.0	0.33	mg/Kg
BNA	FLUORENE	8270C/D	SS	51.1-109	20.0	0.33	mg/Kg
BNA	FLUORANTHENE	8270C/D	SS	53.7-110	20.0	0.33	mg/Kg
BNA	DI-N-OCTYL PHTHALATE	8270C/D	SS	49.6-112	20.0	0.33	mg/Kg
BNA	DI-N-BUTYL PHTHALATE	8270C/D	SS	49.7-113	20.0	0.33	mg/Kg
BNA	DIMETHYL PHTHALATE	8270C/D	SS	51.4-108	20.0	0.33	mg/Kg
BNA	DIETHYL PHTHALATE	8270C/D	SS	52.0-112	20.0	0.33	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	DIBENZOFURAN	8270C/D	SS	48.6-104	20.0	0.33	mg/Kg
BNA	DIBENZ(A,H)ANTHRACENE	8270C/D	SS	45.7-111	20.0	0.33	mg/Kg
BNA	CHRYSENE	8270C/D	SS	54.4-110	20.0	0.33	mg/Kg
BNA	CARBAZOLE	8270C/D	SS	52.4-102	21.1	0.33	mg/Kg
BNA	CAPROLACTAM	8270C/D	SS	42.2-107	21.9	0.33	mg/Kg
BNA	BIS(2-ETHYLHEXYL)PHTHALATE	8270C/D	SS	48.1-116	20.5	0.33	mg/Kg
BNA	BIS(2-CHLOROISOPROPYL)ETHER	8270C/D	SS	40.4-99.0	20.7	0.33	mg/Kg
BNA	BIS(2-CHLOROETHYL)ETHER	8270C/D	SS	32.5-112	26.0	0.33	mg/Kg
BNA	BIS(2-CHLORETHOXY)METHANE	8270C/D	SS	44.9-108	20.0	0.33	mg/Kg
BNA	BIPHENYL	8270C/D	SS	45.6-103	20.0	0.33	mg/Kg
BNA	BENZYLBUTYL PHTHALATE	8270C/D	SS	47.5-115	20.0	0.33	mg/Kg
BNA	BENZYL ALCOHOL	8270C/D	SS	49.1-105	20.0	0.033	mg/Kg
BNA	BENZOIC ACID	8270C/D	SS	0.00-82.0	32.5	0.033	mg/Kg
BNA	BENZO(K)FLUORANTHENE	8270C/D	SS	52.9-107	20.0	0.33	mg/Kg
BNA	BENZO(G,H,I)PERYLENE	8270C/D	SS	45.8-108	20.0	0.33	mg/Kg
BNA	BENZO(B)FLUORANTHENE	8270C/D	SS	51.3-106	20.0	0.33	mg/Kg
BNA	BENZO(A)PYRENE	8270C/D	SS	51.9-106	20.0	0.33	mg/Kg
BNA	BENZO(A)ANTHRACENE	8270C/D	SS	52.3-106	20.0	0.33	mg/Kg
BNA	BENZIDINE	8270C/D	SS	0.00-48.0	40.0	0.033	mg/Kg
BNA	BENZALDEHYDE	8270C/D	SS	46.4-109	24.8	0.33	mg/Kg
BNA	AZOBENZENE	8270C/D	SS	45.0-131	20.0	0.33	mg/Kg
BNA	ATRAZINE	8270C/D	SS	45.0-131	20.0	0.33	mg/Kg
BNA	ANTHRACENE	8270C/D	SS	52.0-112	20.0	0.33	mg/Kg
BNA	ANILINE	8270C/D	SS	10.0-94.0	24.2	0.33	mg/Kg
BNA	ACETOPHENONE	8270C/D	SS	47.1-99.0	22.1	0.33	mg/Kg
BNA	ACENAPHTHYLENE	8270C/D	SS	49.2-111	20.0	0.033	mg/Kg
BNA	ACENAPHTHENE	8270C/D	SS	48.9-107	20.0	0.033	mg/Kg
BNA	4-NITROPHENOL	8270C/D	SS	34.8-109	20.0	0.033	mg/Kg
BNA	4-NITROANILINE	8270C/D	SS	38.6-133	21.7	0.033	mg/Kg
BNA	4-CHLOROPHENYL-PHENYLETHER	8270C/D	SS	48.1-108	20.0	0.033	mg/Kg
BNA	4-CHLOROANILINE	8270C/D	SS	24.5-101	24.5	0.33	mg/Kg
BNA	4-CHLORO-3-METHYLPHENOL	8270C/D	SS	51.1-113	20.0	0.33	mg/Kg
BNA	4-BROMOPHENYL-PHENYLETHER	8270C/D	SS	51.4-110	20.0	0.33	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	4,6-DINITRO-2-METHYLPHENOL	8270C/D	SS	23.1-119	23.7	0.33	mg/Kg
BNA	3-NITROANILINE	8270C/D	SS	34.7-103	20.7	0.33	mg/Kg
BNA	3,3-DICHLOROBENZIDINE	8270C/D	SS	21.0-101	22.0	0.33	mg/Kg
BNA	3&4-METHYLPHENOL	8270C/D	SS	50.5-115	20.0	0.33	mg/Kg
BNA	2-NITROPHENOL	8270C/D	SS	44.2-113	20.9	0.33	mg/Kg
BNA	2-NITROANILINE	8270C/D	SS	56.2-117	20.0	0.33	mg/Kg
BNA	2-METHYLPHENOL	8270C/D	SS	53.8-107	20.0	0.33	mg/Kg
BNA	2-METHYLNAPHTHALENE	8270C/D	SS	42.4-100	20.0	0.033	mg/Kg
BNA	2-CHLOROPHENOL	8270C/D	SS	48.0-101	20.0	0.33	mg/Kg
BNA	2-CHLORONAPHTHALENE	8270C/D	SS	40.8-103	20.0	0.33	mg/Kg
BNA	2,6-DINITROTOLUENE	8270C/D	SS	47.1-105	20.0	0.33	mg/Kg
BNA	2,4-DINITROTOLUENE	8270C/D	SS	51.6-110	20.0	0.033	mg/Kg
BNA	2,4-DINITROPHENOL	8270C/D	SS	53.0-112	36.5	0.33	mg/Kg
BNA	2,4-DIMETHYLPHENOL	8270C/D	SS	10.0-105	20.0	0.33	mg/Kg
BNA	2,4-DICHLOROPHENOL	8270C/D	SS	42.2-109	20.0	0.33	mg/Kg
BNA	2,4,6-TRICHLOROPHENOL	8270C/D	SS	44.4-108	20.0	0.33	mg/Kg
BNA	2,4,5-TRICHLOROPHENOL	8270C/D	SS	43.3-110	20.0	0.33	mg/Kg
BNA	1-METHYLNAPHTHALENE	8270C/D	SS	49.8-104	20.0	0.33	mg/Kg
BNA	1,4-DICHLOROBENZENE	8270C/D	SS	36.5-97.0	20.0	0.33	mg/Kg
BNA	1,3-DICHLOROBENZENE	8270C/D	SS	35.0-94.0	20.0	0.33	mg/Kg
BNA	1,2-DICHLOROBENZENE	8270C/D	SS	37.2-98.0	20.0	0.33	mg/Kg
BNA	1,2,4-TRICHLOROBENZENE	8270C/D	SS	39.8-100	20.0	0.33	mg/Kg
BNA	1,2,4,5-TETRACHLOROBENZENE	8270C/D	SS	47.6-107	20.0	0.33	mg/Kg
BNA	PYRIDINE	8270C/D RV	GW,WW	13.5-58.9	32.5	0.01	mg/L
BNA	PYRENE	8270C/D RV	GW,WW	463-117	20.0	0.0002	mg/L
BNA	PHENOL	8270C/D RV	GW,WW	10.0-57.9	35.0	0.01	mg/L
BNA	PHENANTHRENE	8270C/D RV	GW,WW	46.4-113	20.0	0.0002	mg/L
BNA	PENTACHLOROPHENOL	8270C/D RV	GW,WW	10.9-97.4	35.1	0.01	mg/L
BNA	N-OCTADECANE	8270C/D RV	GW,WW	15.8-132	21.1	0.01	mg/L
BNA	N-NITROSODIMETHYLAMINE	8270C/D RV ISOTOPE DIL	GW,WW	60-140	20.0	0.01/ .05ug/L SIM	mg/L
BNA	1,4-DIOXANE	8270C/D RV ISOTOPE DIL	GW,WW	60-140	20.0	.4ug/L SIM	mg/L
BNA	N-NITROSODI-N-PROPYLAMINE	8270C/D RV	GW,WW	33.2-106	23.7	0.01	mg/L
BNA	N-NITROSODIMETHYLAMINE	8270C/D RV	GW,WW	33.2-106	37.5	0.01	mg/L
BNA	NITROBENZENE	8270C/D RV	GW,WW	31.4-106	25.7	0.01	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	N-DECANE	8270C/D RV	GW,WW	10.0-95.2	40.0	0.01	mg/L
BNA	NAPHTHALENE	8270C/D RV	GW,WW	32.2-101	23.8	0.001	mg/L
BNA	ISOPHORONE	8270C/D RV	GW,WW	35.4-112	21.5	0.01	mg/L
BNA	INDENO(1,2,3-CD)PYRENE	8270C/D RV	GW,WW	45.0-116	20.0	0.0002	mg/L
BNA	HEXACHLOROETHANE	8270C/D RV	GW,WW	16.5-89.8	30.7	0.01	mg/L
BNA	HEXACHLOROCYCLOPENTADIENE	8270C/D RV	GW,WW	10.0-121	27.9	0.01	mg/L
BNA	HEXACHLOROBENZENE	8270C/D RV	GW,WW	38.5-116	20.1	0.001	mg/L
BNA	HEXACHLORO-1,3-BUTADIENE	8270C/D RV	GW,WW	16.1-104	31.2	0.01	mg/L
BNA	FLUORENE	8270C/D RV	GW,WW	41.0-112	20.2	0.0002	mg/L
BNA	FLUORANTHENE	8270C/D RV	GW,WW	45.9-115	20.0	0.0002	mg/L
BNA	DI-N-OCTYL PHTHALATE	8270C/D RV	GW,WW	39.7-112	21.1	0.003	mg/L
BNA	DI-N-BUTYL PHTHALATE	8270C/D RV	GW,WW	41.8-120	20.2	0.003	mg/L
BNA	DIMETHYL PHTHALATE	8270C/D RV	GW,WW	35.3-128	20.8	0.003	mg/L
BNA	DIETHYL PHTHALATE	8270C/D RV	GW,WW	36.5-129	20.0	0.003	mg/L
BNA	DIBENZOFURAN	8270C/D RV	GW,WW	42.4-105	20.0	0.01	mg/L
BNA	DIBENZ(A,H)ANTHRACENE	8270C/D RV	GW,WW	42.8-118	20.0	0.0002	mg/L
BNA	CHRYSENE	8270C/D RV	GW,WW	54.6-120	20.0	0.0002	mg/L
BNA	CARBAZOLE	8270C/D RV	GW,WW	49.0-110	20.0	0.01	mg/L
BNA	CAPROLACTAM	8270C/D RV	GW,WW	10.0-40.4	40.0	0.01	mg/L
BNA	BIS(2-ETHYLHEXYL)PHTHALATE	8270C/D RV	GW,WW	36.9-134	23.6	0.003	mg/L
BNA	BIS(2-CHLOROISOPROPYL)ETHER	8270C/D RV	GW,WW	32.9-100	25.1	0.01	mg/L
BNA	BIS(2-CHLOROETHYL)ETHER	8270C/D RV	GW,WW	22.6-108	27.9	0.01	mg/L
BNA	BIS(2-CHLORETHOXY)METHANE	8270C/D RV	GW,WW	37.2-111	24.1	0.01	mg/L
BNA	BIPHENYL	8270C/D RV	GW,WW	38.0-103	20.1	0.01	mg/L
BNA	BENZYLBUTYL PHTHALATE	8270C/D RV	GW,WW	31.8-123	20.7	0.003	mg/L
BNA	BENZYL ALCOHOL	8270C/D RV	GW,WW	30.1-89.2	24.8	0.01	mg/L
BNA	BENZOIC ACID	8270C/D RV	GW,WW	0.00-79.4	31.1	0.05	mg/L
BNA	BENZO(K)FLUORANTHENE	8270C/D RV	GW,WW	49.4-114	20.0	0.0002	mg/L
BNA	BENZO(G,H,I)PERYLENE	8270C/D RV	GW,WW	45.2-117	20.0	0.0002	mg/L
BNA	BENZO(B)FLUORANTHENE	8270C/D RV	GW,WW	47.6-110	20.0	0.0002	mg/L
BNA	BENZO(A)PYRENE	8270C/D RV	GW,WW	45.6-106	20.0	0.0002	mg/L
BNA	BENZO(A)ANTHRACENE	8270C/D RV	GW,WW	51.2-112	20.0	0.0002	mg/L
BNA	BENZIDINE	8270C/D RV	GW,WW	10.0-165	40.0	0.05	mg/L
BNA	BENZALDEHYDE	8270C/D RV	GW,WW	11.7-132	25.2	0.01	mg/L
BNA	AZOBENZENE	8270C/D RV	GW,WW	37.6-111	21.1	0.01	mg/L
BNA	ATRAZINE	8270C/D RV	GW,WW	50.0-123	21.5	0.01	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	ANTHRACENE	8270C/D RV	GW,WW	43.6-113	18.7	0.0002	mg/L
BNA	ANILINE	8270C/D RV	GW,WW	25.8-88.1	26.3	0.01	mg/L
BNA	ACETOPHENONE	8270C/D RV	GW,WW	41.6-104	24.8	0.01	mg/L
BNA	ACENAPHTHYLENE	8270C/D RV	GW,WW	36.0-106	21.0	0.0002	mg/L
BNA	ACENAPHTHENE	8270C/D RV	GW,WW	38.7-109	21.5	0.0002	mg/L
BNA	4-NITROPHENOL	8270C/D RV	GW,WW	10.0-52.7	40.0	0.01	mg/L
BNA	4-NITROANILINE	8270C/D RV	GW,WW	35.4-124	23.1	0.01	mg/L
BNA	4-CHLOROPHENYL-PHENYLETHER	8270C/D RV	GW,WW	39.0-113	20.9	0.01	mg/L
BNA	4-CHLOROANILINE	8270C/D RV	GW,WW	32.0-104	26.4	0.01	mg/L
BNA	4-CHLORO-3-METHYLPHENOL	8270C/D RV	GW,WW	35.7-100	22.9	0.01	mg/L
BNA	4-BROMOPHENYL-PHENYLETHER	8270C/D RV	GW,WW	40.7-116	21.0	0.01	mg/L
BNA	4,6-DINITRO-2-METHYLPHENOL	8270C/D RV	GW,WW	18.4-148	24.4	0.01	mg/L
BNA	3-NITROANILINE	8270C/D RV	GW,WW	33.6-103	21.8	0.01	mg/L
BNA	3,3-DICHLOROBENZIDINE	8270C/D RV	GW,WW	27.2-142	22.3	0.01	mg/L
BNA	3&4-METHYLPHENOL	8270C/D RV	GW,WW	27.9-92	27.0	0.01	mg/L
BNA	2-NITROPHENOL	8270C/D RV	GW,WW	25.9-106	26.9	0.01	mg/L
BNA	2-NITROANILINE	8270C/D RV	GW,WW	56.4-173	20.0	0.01	mg/L
BNA	2-METHYLPHENOL	8270C/D RV	GW,WW	35.6-113	20.9	0.01	mg/L
BNA	2-METHYLNAPHTHALENE	8270C/D RV	GW,WW	26.4-86.9	26.5	0.001	mg/L
BNA	2-CHLOROPHENOL	8270C/D RV	GW,WW	33.8-98.6	24.2	0.01	mg/L
BNA	2-CHLORONAPHTHALENE	8270C/D RV	GW,WW	26.2-91.5	26.5	0.001	mg/L
BNA	2,6-DINITROTOLUENE	8270C/D RV	GW,WW	33.6-105	23.0	0.01	mg/L
BNA	2,4-DINITROTOLUENE	8270C/D RV	GW,WW	30.6-106	23.1	0.01	mg/L
BNA	2,4-DINITROPHENOL	8270C/D RV	GW,WW	31.2-105	22.0	0.01	mg/L
BNA	2,4-DIMETHYLPHENOL	8270C/D RV	GW,WW	24.2-128	20.5	0.01	mg/L
BNA	2,4-DICHLOROPHENOL	8270C/D RV	GW,WW	31.9-107	25.7	0.01	mg/L
BNA	2,4,6-TRICHLOROPHENOL	8270C/D RV	GW,WW	31.4-103	24.9	0.01	mg/L
BNA	2,4,5-TRICHLOROPHENOL	8270C/D RV	GW,WW	29.8-107	24.1	0.01	mg/L
BNA	2,3,4,6-TETRACHLOROPHENOL	8270C/D RV	GW,WW	34.9-112	23.9	0.01	mg/L
BNA	1-METHYLNAPHTHALENE	8270C/D RV	GW,WW	34.7-102	24.9	0.01	mg/L
BNA	1,4-DICHLOROBENZENE	8270C/D RV	GW,WW	21.0-89.4	32.6	0.01	mg/L
BNA	1,3-DICHLOROBENZENE	8270C/D RV	GW,WW	20.9-86.7	32.4	0.01	mg/L
BNA	1,2-DICHLOROBENZENE	8270C/D RV	GW,WW	23.7-91.9	31.9	0.01	mg/L
BNA	1,2,4-TRICHLOROBENZENE	8270C/D RV	GW,WW	22.9-96.1	27.5	0.01	mg/L
BNA	1,2,4,5-TETRACHLOROBENZENE	8270C/D RV	GW,WW	30.7-102	27.7	0.01	mg/L
BNA	SULFOLANE	8270C/D	GW, WW	70.0-130	20.0	0.2	ug/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
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Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
BNA	SULFOLANE	8270C/D	SS	70.0-130	20.0	0.33	ug/kg
Glycols	ETHYLENE GLYCOL	8015	SS	70.0-130	20.0	5.0	mg/L
Glycols	PROPYLENE GLYCOL	8015	SS	70.0-130	20.0	5.0	mg/L
Glycols	ETHYLENE GLYCOL	8015	GW,WW	70.0-130	20.0	5.0	mg/L
Glycols	PROPYLENE GLYCOL	8015	GW,WW	70.0-130	20.0	5.0	mg/L
Explosives	1,3,5-TRINITROBENZENE	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	1,3-DINITROBENZENE	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	2,4,6-TRINITROTOLUENE	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	2,4-DINITROTOLUENE	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	2,6-DINITROTOLUENE	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	2-NITROTOLUENE	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	3-NITROTOLUENE	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	4-NITROTOLUENE (4-NT)	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	METHYL-2,4,6-TRINITROPHENYLNITRAMINE	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	NITROBENZENE	8330A/B	SS	70.0-130	20.0	0.5	mg/Kg
Explosives	OCTAHYDRO - 1,3,5,7 - TETRANITRO-1,3,5,7-TETRAZOCINE (HMX)	8330A/B	SS	70.0-130	20.0	0.0005	mg/Kg
Explosives	PENTAERYTHRITOL TETRANITRATE (PETN)	8330A/B	SS	70.0-130	20.0	2	mg/Kg
Explosives	NITROGLYCERINE	8330A/B	SS	70.0-130	20.0	2	mg/Kg
Explosives	NITROGUANIDINE	8330A/B	SS	70.0-130	20.0	8	mg/Kg
Explosives	1,3,5-TRINITROBENZENE	8330A/B	GW	70.1-98.5	20.0	0.0005	mg/L
Explosives	1,3-DINITROBENZENE	8330A/B	GW	50.8-88.7	24.2	0.0005	mg/L
Explosives	2,4,6-TRINITROTOLUENE	8330A/B	GW	61.4-102	20.0	0.0005	mg/L
Explosives	2,4-DINITROTOLUENE	8330A/B	GW	40.2-91.7	36.2	0.0005	mg/L
Explosives	2,6-DINITROTOLUENE	8330A/B	GW	47.0-94.4	29.4	0.0005	mg/L
Explosives	2-NITROTOLUENE	8330A/B	GW	43.3-93.9	30.4	0.0005	mg/L
Explosives	3-NITROTOLUENE	8330A/B	GW	36.8-89.5	37.3	0.0005	mg/L
Explosives	4-NITROTOLUENE (4-NT)	8330A/B	GW	41.1-93.1	34.4	0.0005	mg/L
Explosives	HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	8330A/B	GW	63.1-94.2	20.0	0.0005	mg/L
Explosives	METHYL-2,4,6-TRINITROPHENYLNITRAMINE	8330A/B	GW	57.6-104	20.0	0.0005	mg/L
Explosives	NITROBENZENE	8330A/B	GW	56.0-99.0	20.4	0.0005	mg/L

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
Explosives	OCTAHYDRO - 1,3,5,7 - TETRANITRO-1,3,5,7-TETRAZOCINE (HMX)	8330A/B	GW	58.1-100	20.0	0.0005	mg/L
Explosives	PENTAERYTHRITOL TETRANITRATE (PETN)	8330A/B	GW	67.1-110	20.0	0.0005	mg/L
Explosives	NITROGLYCERINE	8330A/B	GW	65.0-126	20.0	0.0005	mg/L
GC	1, 2 DIBROMOETHANE (EDB)	504/8011	DW,GW, WW	70.0-130	30	0.00002	mg/L
GC	1, 2 DIBROMO-3-CHLOROPROPANE	504/8011	DW,GW, WW	70.0-130	30	0.00002	mg/L
GC	1,2,3-TRICHLOROPROPANE	504/8011	DW,GW, WW	70.0-130	30	0.0005	mg/L
THAA	BROMOACETIC ACID	552.2	DW	70.0-130	30	0.001	mg/L
THAA	CHLOROACETIC ACID	552.2	DW	70.0-130	30	0.002	mg/L
THAA	DIBROMOACETIC ACID	552.2	DW	70.0-130	30	0.001	mg/L
THAA	DICHLOROACETIC ACID	552.2	DW	70.0-130	30	0.001	mg/L
THAA	TRICHLOROACETIC ACID	552.2	DW	70.0-130	30	0.001	mg/L
TPH	PETROLEUM RANGE ORGANICS (TRPH)	FL-PRO RV	GW,	50.0-150	20.0	0.1	mg/L
TPH	PETROLEUM RANGE ORGANICS (TRPH)	FL-PRO	SS	50.0-150	20.0	4.0	mg/Kg
TPH	PETROLEUM RANGE ORGANICS (TRPH)	EPH TN	GW	50.0-150	20.0	0.1	mg/L
TPH	PETROLEUM RANGE ORGANICS (TRPH)	EPH TN	SS	50.0-150	20.0	4.0	mg/Kg
TPH	PETROLEUM RANGE ORGANICS (TRPH) - C9-C18, C19-C36, C11-C22	MADEP EPH	GW, WW	50.0-150	20.0	0.1	mg/L
TPH	PETROLEUM RANGE ORGANICS (TRPH) - C9-C18, C19-C36, C11-C22	MADEP EPH	SS	50.0-150	20.0	5.5	mg/Kg
TPH	PETROLEUM RANGE ORGANICS (TRPH) - C10-C28	DRO, 8015Mod	GW, WW	50.0-150	20.0	0.1	mg/L
TPH	PETROLEUM RANGE ORGANICS (TRPH) - C10-C28	DRO, 8015Mod	SS	50.0-150	20.0	4.0	mg/Kg
TPH	PETROLEUM RANGE ORGANICS (TRPH) – C10-C20, C20-C34	OHIO DRO	GW, WW	50.0-150	20.0	0.1	mg/L
TPH	PETROLEUM RANGE ORGANICS (TRPH) – C10-C20, C20-C34	OHIO DRO	SS	50.0-150	20.0	4.0	mg/Kg
TPH	PETROLEUM RANGE ORGANICS (TRPH) – GAS, DIESEL, MOTOR OIL, ETC.	OA2	GW, WW	50.0-150	20.0	0.1	mg/L
TPH	PETROLEUM RANGE ORGANICS (TRPH) – GAS, DIESEL, MOTOR OIL, ETC.	OA2	SS	50.0-150	20.0	4.0	mg/Kg

Table 12.3: QC Targets for Semi-Volatiles Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Class	Analyte	Method	Matrix	Accuracy (%)	Prec. (RPD)	RL	Unit
TPH	PETROLEUM RANGE ORGANICS - C10-C28, C28-C40	DRORLA	GW, WW	50.0-150	20.0	0.1	mg/L
TPH	PETROLEUM RANGE ORGANICS - C10-C28, C28-C40	DRORLA	SS	50.0-150	20.0	4.0	mg/Kg
TPH	PETROLEUM RANGE ORGANICS – C10-C32	DROWY	GW, WW	50.0-150	20.0	0.1	mg/L
TPH	PETROLEUM RANGE ORGANICS – C10-C32	DROWY	SS	50.0-150	20.0	4.0	mg/Kg
TPH	PETROLEUM RANGE ORGANICS – GAS, DIESEL, MOTOR OIL, ETC.	NWTPH-Dx	GW, WW	50.0-150	20.0	0.25	mg/L
TPH	PETROLEUM RANGE ORGANICS – GAS, DIESEL, MOTOR OIL, ETC.	NWTPH-Dx	SS	50.0-150	20.0	25	mg/Kg
TPH	PETROLEUM RANGE ORGANICS – C10-C28	DROWM	GW, WW	75.0-115	20.0	0.1	mg/L
TPH	PETROLEUM RANGE ORGANICS – C10-C28	DROWM	SS	70.0-120	20.0	10	mg/Kg
TPH	PETROLEUM RANGE ORGANICS – C10-C22	TPHAZ	SS	70.0-130	20.0	30	mg/Kg
TPH	PETROLEUM RANGE ORGANICS – C22-C32	TPHAZ	SS	70.0-130	20.0	100.	mg/Kg
TPH	PETROLEUM RANGE ORGANICS – C10-C32	TPHAZ	SS	70.0-130	20.0	130.	mg/Kg
TPH	PETROLEUM RANGE ORGANICS - C6-C12, C12-C28, C28-C35, C6-C35	TX TPH	SS	75.0-125	20.0	50	mg/Kg
TPH	PETROLEUM RANGE ORGANICS - C10-C21, C21-C35	DROMO	GW, WW	75.0-125	20.0	1.0	mg/L
TPH	PETROLEUM RANGE ORGANICS - C10-C21, C21-C35	DROMO	SS	75.0-125	20.0	20	mg/Kg

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CAR is kept on file by the Regulatory Affairs Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these limits are exceeded, corrective action must be taken. Calculated sample spike control limits are also used.

All samples and procedures are governed by ESCs quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP.

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria takes precedence.

13.2.2 Out Of Control Blanks: Applies to Method, Trip, Rinsate & Instrument Blanks

Rejection Criteria - Blank reading is more than twice the background absorbance or more than RL.

Corrective Action - Blanks are re-analyzed and the response is assessed. Standard curves and samples are evaluated for any obvious contamination that is isolated or uniform throughout the run. If necessary, reagents are re-prepared. Analyses are not initiated until the problem is identified and solved. If samples have already been prepared or analyzed, the Senior Chemist and/or Department Supervisor are consulted to determine if data needs to be rejected or if samples need to be re-prepared.

13.2.3 Out Of Control Laboratory Control Standards (LCS & LCSD)

Rejection Criteria - If the performance is outside of lab-generated control limits which are calculated as the mean of at least 20 data points $\pm$3 times the standard deviation of those points (Listed in Section 12) and the marginal excedence allowance is surpassed (see section 12.2).

Corrective Action - Instrument settings are checked and the LCS standard is reanalyzed. If the LCS is still out of control, instrumentation is checked for systemic problems and repaired (if necessary). Re-calibration is performed and the samples affected since the last in control reference standard are rerun. The Senior Chemist and/or Department Supervisor are consulted for further action.

13.2.4 Out Of Control Matrix Spike Samples

Rejection Criteria - If either the MS or MSD sample is outside the established control limits.

Corrective Action - Any compound that is outside of these limits is considered to be ‘out of control’ and must be qualified appropriately. Batch acceptance, however, is based on

method blank and LCS performance, not on MS/MSD recoveries. Specific methods, customers, and programs may require further corrective action in some cases.

13.2.5 Out Of Control Duplicate Samples

Rejection Criteria - Lab-generated maximum RPD limit (as listed under precision in Section 12)

Corrective Action - Any compound that is outside of these limits is considered to be 'out of control' and must be qualified appropriately. Batch acceptance, however, is based on method blank and LCS performance. Specific methods, customers, and programs may require further corrective action in some cases.

13.2.7 Out Of Control Calibration Standards: ICV, CCV, SSCV

Rejection Criteria - If the performance is outside of method requirements.

Corrective Action - Instrument settings are checked, calibration verification standard is reanalyzed. If the standard is still out of control, recalibration is performed, and samples affected since the last in control reference standard are rerun. The the Senior Chemist and/or Department Supervisor are consulted for further action.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #030230, *Standards Logger, SOP #030227, Data Review* and SOP #030201, *Data Handling and Reporting.* Semi-Volatile organics calibration data are recorded and integrated using HP Enviroquant software. Calibration data from the semi-volatile analyses, in addition to the initial and daily calibration, includes GC/MS autotunes, DFTPP reports and surrogate recovery reports. Hard copy records of initial calibration and daily calibration are stored with chromatograms and integrated with sample data by date analyzed.

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 12.0 and *SOP #010104, Internal Audits*.

16.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix VII)	General – Replaced the term “client” with the term “customer” Table 8.1 – Updated Equipment List Table 10.1 – Updated SOP List Table 12.3 – Updated some RLs and added 1,4-Dioxane by Isotope Dilution

1.0 SIGNATORY APPROVALS

Air Laboratory
QUALITY ASSURANCE MANUAL

APPENDIX VIII TO THE ESC QUALITY ASSURANCE MANUAL

for

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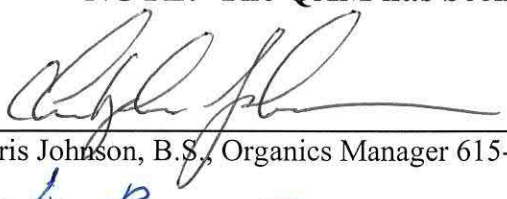
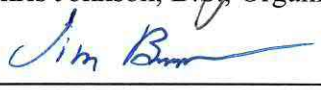
NOTE: The QAM has been approved by the following people.



Chris Johnson, B.S., Organics Manager 615-773-9774



Jim Brownfield, B.S., Compliance Director 615-773-9681

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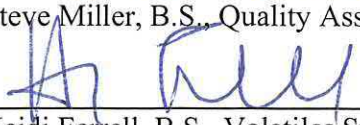

Heidi Ferrell, B.S., Volatiles Supervisor, 615-773-9799

2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that analytical data generated from the Air Laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the customer with both routine and specialized services, field sampling guidance and equipment, and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Heidi Ferrell, with a B.S. degree in Chemistry, is the Department Supervisor and is responsible for the overall production of the Air Laboratory; including the management of the staff and scheduling. Ms. Ferrell has 10 years of environmental laboratory experience.

In her absence, Matt Ferrell, with an A.S. of Applied Science, assumes responsibility for the Air Department decisions. Mr. Ferrell is the Primary Analyst for the Air Laboratory and is proficient in air analytical methods. He has 6 years of environmental laboratory experience.

5.2 TRAINING

The Supervisor trains new laboratory analysts according to ESC protocol. ESC's training program is outlined in *SOP 030205 Technical Training and Personnel Qualifications.* Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in Air Laboratory is also demonstrated by acceptable participation in the Phenova proficiency testing program (PTs). Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the laboratory has approximately 670 square feet of area with roughly 150 square feet of bench area. There are 670 square feet of additional storage and the lighting is fluorescence. The air system is a ten-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the US Filter deionizer system. Waste disposal containers are located in the laboratory and Clean Harbors serves as ESC's hazardous waste disposal company. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where chemicals are prepared or splashes may occur are conducted in laboratory exhaust hoods.

ESC's laboratory safety guidelines are detailed in the *ESC Chemical Hygiene Plan.*

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedures are described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Samples for air analysis are collected in four ways:
  - Samples may be collected directly in evacuated Summa canisters fit with the appropriately adjusted regulators that control sampling flow to fill the canister over a given time period.
  - Summa canisters may also be collected as "grab" samples by simply opening the evacuated canister without the aid of a flow regulator and allowing the canister to fill quickly by virtue of the canister vacuum.
  - The third method entails collection of field samples using various sized bags specifically designed for air sampling (i.e. Tedlar). This type of sampling allows a pump connected via tubing to the bag's intake valve to sample the air at a controlled flow and over the appropriate timeframe needed by the customer.
  - The headspace of containers housing water samples may also be analyzed for specific volatile components.

- Air samples taken in summa canisters should be shipped in bubble wrapped boxes. Tedlar bags and water samples can be shipped in a container or cooler that is sufficiently rigid and protects the samples from damage that may be incurred in transport. The chain of custody is also placed in the container. The shipping label containing the name and address of the shipper is affixed to the outside of the shipment container.
- Samples are received in the laboratory login area and are tracked using LIMS (Laboratory Information Management System). A Chain of Custody Form accompanies all samples received by the lab. This is necessary to prove the traceability of the samples and to document the change in possession from sampling to delivery to receipt by the laboratory. Prior to analysis samples are checked for integrity. Sample handling, tracking and acceptance procedures are outlined in *SOP #060105, Sample Receiving.*

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

TABLE 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Air Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Gas Chromatograph	HP	6890N TCD	AIRGC3	1	US10726007	Air Lab
Gas Chromatograph/Mass Spectrometer	HP	6890 GC/5973MSD	AIRMS1	1	GCUS00024616 MSUS63810244	Air Lab
Gas Chromatograph/Mass Spectrometer	Agilent	6890N/5975	AIRMS2	2	CN10551083	Air Lab
Gas Chromatograph/Mass Spectrometer	Agilent	6890/5973	AIRMS3	3	US000011333 US91911078	Air Lab
Gas Chromatograph/Mass Spectrometer	Agilent	6890/5973	AIRMS4	4	US00024695 US82311265	Air Lab
Gas Chromatograph/Mass Spectrometer	Agilent	6890/5973	AIRMS5	5	GCUS0003961 MSUS0340681	Air Lab
Gas Chomatograph/Mass Spectrometer	Agilent	7890A/5975C	AIRMS6	6	GCUS10831022 MSU91732329	Air Lab
Canister Autosampler	Entech	7016C			0203	Air Lab
Preconcentrator	Entech	7100A			1089	Air Lab
Preconcentrator	Entech	7200			1005	Air Lab
Canister Autosampler	Entech	7016CA			1039	Air Lab
Tedlar Autosampler	Entech	(3) 7032A-L			1019	Air Lab
Dynamic Diluter	Entech	Model 4600A			1086	Air Lab
Canister Cleaner	Entech	Model 3100A			1045	Air Lab
Canister Cleaner	Entech	Model 3100A			1178	Air Lab
Canister cleaner	Entech	Model 3100A			B33-02663	Air Lab
Preconcentrator	Entech	7100A			1137	Air Lab
Canister Autosampler	(2) Entech	7016D				Air Lab
Preconcentrator	(2) Entech	7200				Air Lab
Tedlar Autosampler	Entech	7032A			1044	Air Lab

TABLE 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Air Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Instrument Name*	*#*	*Serial #*	*Location*
Canister Autosampler	Entech	7016CA			1137	Air Lab
GC/FID	Agilent	6890N	AIRGC2	2	US10137006	Air Lab
Headspace Autosampler	(2) EST/PTS	LGX50				Air Lab
TO Canister	Restek/Entech	TO-Can/ SiloniteCan	2200 cans owned		N/A	Air Lab
Passive Sampling Kit	Restek		1500 owned		N/A	Air Lab
Field hand held PID	RAE Systems	MiniRae2000			110-012980	Air Lab
Field hand held PID	RAE Systems	MiniRAE2000				Air Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

INSTRUMENT	*P. M. DESCRIPTION*	*FREQUENCY*
Gas Chromatograph Detectors: FID	Change Quartz jet; clean; replace flame tip	As needed - when deterioration is noticeable
Gas Chromatograph/Mass Spectrometer	•Autotune Report	Inspected daily
Gas Chromatograph/Mass Spectrometer	•Clean ion source	As needed to maintain high mass resolution
Gas Chromatograph/Mass Spectrometer	•Replace vacuum pump oil	Every 6 months
Gas Chromatographs	•Replace column	When separation begins to degrade

8.3 STANDARDS AND REAGENTS

Table 8.3A: Standard stock sources, description and calibration information.
This table is subject to revision without notice

Method	Vendor	Description	Conc.	Storage Req.	Expiration
TO-15/SIM/8260B (VAP)/Method 8-mod. ISTD Stock Standard	Spectra Gases	ISTD and Tuning Mixture	1 ppmv	3395 L (2A) cylinder	1 year
TO-15/SIM/8260B (VAP)/Method 18-mod. Stock Standard*	Spectra Gases	Target Analytes	100 ppbv	3395 L (2A) cylinder	1 year
Landfill Gases Stock (CO_2, CO, CH_6, O_2, He)	Spectra Gases	Target Analytes	3 Levels	3395 L (2A) cylinder	1 year
Landfill Gases Laboratory Control Stock Standard	Spectra Gases	Target Analytes – Second Source	20%	3395 L (2A) cylinder	1 year
RSK-175 (Methane, Ethane, Ethene, Propane, Acetylene) Stock Standard	Scotty Gases	Target Analytes	1000 ppmv	3395 L (2A) cylinder	1 year
RSK-175 Laboratory Control Stock Standard	Scotty Gases	Target Analytes – Second Source	1000 ppmv	3395 L (2A) cylinder	1 year

TABLE 8.3B: Intermediate/Working Standard Concentrations *This table is subject to revision without notice*					
Organic Compounds	**Method #**	**Working Standard Concentrations**	**Volume of Stock Used**	**Final Volume**	**Expiration**
ISTD and Tuning Intermediate Standard	TO-15/8260B (VAP)/Method 18.	20 ppbv	1800 cc	15L in 15L Canister	1 year
Target Analytes* Intermediate Standard	TO-15/8260B (VAP)/Method 18	5 ppbv except Bromoform at 5ppbv, m&p Xylene at 10 ppbv and GRO at 200 ppbv	225 cc	15L in 15L Canister	1 year
TO-15/ 8260B(VAP)/ Method 18-mod. Laboratory Control* Intermediate Standard	TO-15/8260B (VAP)/Method 18	Second Source: 5 ppbv except Bromoform at 15ppbv, m&p Xylene at 10 ppbv and GRO at 200	225 cc	15L in 15L Canister	1 year
ISTD and Tuning Intermediate Standard	TO-15SIM	0.2ppbv	300 cc	15L in 15L Canister	1 year
Target Analytes	TO-15SIM	0.5ppbv	22.5 cc	15L in 15L Canister	1 year
TO-15SIM Laboratory Control* Intermediate Standard	TO-15SIM	0.5ppbv	22.5 cc	15L in 15L Canister	1 year

** see analytes listed in Table 12.3.*

8.4 INSTRUMENT CALIBRATION

TO-15, 8260B (Ohio VAP Air), Gasoline Range Components (Method 18) – Volatiles in Air by GC/MS – SOP Numbers 330367, 330368, & 330369

Detector mass calibration is performed daily using the autotune function of the GC/MS analytical system and BFB (Bromofluorobenzene). Following verification of the appropriate masses, the instrument sensitivity is verified by injecting a tuning solution containing Bromofluorobenzene (BFB). The BFB must meet the following ion abundance criteria:

Mass	Ion Abundance Criteria
50	8.0-40.0% of mass 95
75	30.0-66.0% of mass 95
95	base peak, 100% relative abundance
96	5.0-9.0% of mass 95
173	< 2.0% of mass 174
174	50.0-120% of mass 95
175	4.0-9.0% of mass 174
176	> 93.0%, but less than 101% of mass 174

Mass	Ion Abundance Criteria
177	5.0-9.0% of mass 176

Successful tuning must occur every 24 hours for method TO-15, TO-15SIM and Method 18 and every 12 hours for method 8260B (OH VAP only).

Following successful tuning, the GC/MS is calibrated using the internal standard procedure. A standard curve is prepared using a minimum of five standards. The calibration standards are tabulated according to peak height or area against concentrations of the target analytes and the concentrations and responses of the internal standard analytes. The results are used to determine a response factor for each analyte in each standard injected.
A TO-15, TO-15SIM or Method 18 calibration curve is constructed and determined to be acceptable if each analyte is found to be constant over the working range (<30 % RSD with no more than 2 compounds being between 30 and 40 % RSD). When this condition is met, linearity through the origin can be assumed and the average RF can be used in place of a calibration curve.

When analyzing air by method 8260B, specific target analytes in the calibration standards are defined as calibration check compounds (CCCs) or system performance check compounds (SPCCs).

SPCCs:	
Analyte	Minimum Relative Response Factor
Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

CCCs:	
1,1-Dichloroethene	Toluene
Chloroform	Ethylbenzene
1,2-Dichloropropane	Vinyl Chloride

Analytes identified by the method as SPCCs must meet the minimum average response factors listed above for successful initial calibration. Compounds identified as CCCs must have a %RSD of less than 30% in the initial calibration curve. The remaining target analytes in the calibration standards must be <15% RSD. Linear regression can be used for any target compound exceeding the 15% RSD criteria providing that the correlation coefficient is 0.990 or better. Initial 8260B calibration for the target analytes of interest for the customer project that do not meet these requirements are not accepted and re-calibration must be performed.

For all methods, the initial calibration range must represent the typical air sample and include the lowest standard at or below the RL. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range. Following successful calibration, the analysis of field and QC samples may begin. Analysis may be performed only during the timeframe of a valid tuning cycle (12 hours for 8260B and 24 hours for TO-15, TO-15SIM and Method 18). Following the expiration of the tuning clock, the instrument must be re-tuned and either recalibrated or the existing calibration may be verified prior to further sample analysis.

For 8260B analyses, daily continuing calibration verification (CCV) includes successful demonstration of BFB sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest, the CCC, and SPCC compounds. The BFB tune must meet the ion abundance criteria (see table above). Each SPCC in the calibration verification standard must meet a minimum response factors listed above. The CCCs must achieve the criteria of +/- 20% RSD. Each internal standard in the CCV must recover between -50% to + 100%, when compared to the same internal standard compound in the mid-point standard of the initial calibration curve. Additionally, if the retention time of an internal standard changes by more than 30 seconds from the retention time of the same internal standard in the mid-level standard of the most recent initial calibration, the system must be evaluated, corrected, and possibly re-calibrated.

For TO-15,TO-15SIM and Method 18 analyses, daily calibration verification is accomplished by a successful demonstration of BFB sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest. The BFB tune must meet the same ion abundance criteria as previously listed and the CCV standard must recover within 30% of predicted response for all analytes of interest.

Fixed Gases (Carbon Dioxide, Carbon Monoxide, Methane, Oxygen) based on ASTM D1946 – SOP Number 330372

Optimize the conditions of the Gas Chromatograph with Thermal Conductivity Detection according to the manufacturer's specification to provide good resolution and sensitivity. Verify that the gas flows and column and detector temperatures are at optimum levels for analysis, based on peak resolution and chromatograph performance. Allow sufficient time between each temperature adjustment to attain a stable reading (typically one hour). Standards are injected at a minimum of five concentration levels from purchased certified standards. Generation of the initial calibration is performed using PC-based D.01 ChemStation software and a calibration factor or linear regression model. The calibration must meet 15% RSD for calibration factors or a correlation coefficient of at least 0.990. Instrument calibration must be verified initially on days when a full calibration curve is not analyzed, following every 10 injections during the analytical sequence, and at the end of each sequence by the analysis of a check standard. These standards must recover within 15% of the expected concentration.

Methane, Ethane, Ethene, Propane, Acetylene based on RSK-175 – SOP Number 330370

Optimize the conditions of the Gas Chromatograph with Thermal Conductivity Detection according to the manufacturer's specification to provide good resolution and sensitivity. Verify that the gas flows and column and detector temperatures are at optimum levels for analysis, based on peak resolution and chromatograph performance. Allow sufficient time between each temperature adjustment to attain a stable reading (typically one hour). Standards are injected at a minimum of five concentration levels. The target analytes in the calibration standards must be ≤15% RSD. Linear regression can be used for any target compound exceeding the 15% RSD criteria providing that the correlation coefficient is 0.990 or better. Headspace is created in each field sample by forcing 20cc of helium into each sample vial. Following sufficient time for the sample and headspace to reach equilibrium, 100uL of air is removed from each vial and injected into the GC. Instrument calibration must be verified initially on days when a full calibration curve is not analyzed, following every 10 injections during the analytical sequence, and at the end of each sequence by the analysis of a check standard. These standards must recover within 15% of the expected concentration.

Methanol and Ethanol (MEETAC) in soil and water samples based on EPA 8260B/C – SOP Number 330373

Detector mass calibration is performed daily using the autotune function of the GC/MS analytical system and BFB (Bromofluorobenzene). Following verification of the appropriate masses, the instrument sensitivity is verified by injecting a tuning solution containing Bromofluorobenzene (BFB). The BFB must meet the following ion abundance criteria:

Mass	Ion Abundance Criteria
50	15.0-40.0% of mass 95
75	30.0-60.0% of mass 95
95	base peak, 100% relative abundance
96	5.0-9.0% of mass 95
173	< 2.0% of mass 174
174	> 50.0% of mass 95
175	5.0-9.0% of mass 174
176	> 95.0%, but less than 101% of mass 174
177	5.0-9.0% of mass 176

Successful tuning must occur every 12 hours.

Following successful tuning, the GC/MS is calibrated using the external standard procedure. A standard curve is prepared using a minimum of five standards. The calibration standards are tabulated according to peak height or area against concentrations of the target analytes. The results are used to determine a response factor for each analyte in each standard injected. A calibration curve is constructed and determined to be acceptable if each analyte is found to be constant over the working range (<15 % RSD). When this condition is met, linearity through the origin can be assumed and the average CF can be used in place of a calibration curve. Linear regression can be used for any target compound exceeding the 15% RSD criteria providing that the correlation coefficient is 0.990 or better.

The initial calibration range must represent the typical field sample and include the lowest standard at or below the RL. The linear range of the instrument must be monitored to ensure that the maximum calibration point is within the range. Following successful calibration, the analysis of field and QC samples may begin. Analysis may be performed only during the timeframe of a valid tuning cycle (12 hours). Following the expiration of the tuning clock, the instrument must be re-tuned and either recalibrated or the existing calibration may be verified prior to further sample analysis.

Daily calibration verification is accomplished by a successful demonstration of BFB sensitivity and the injection of a mid-level CCV standard containing all the target analytes of interest. The BFB tune must meet the same ion abundance criteria as previously listed and the CCV standard must recover within 15% of predicted response for all analytes of interest.

8.5 ACCEPTANCE/REJECTION OF CALIBRATION

The initial calibration curve is compared with previous curves for the same analyte. All new standard curves are immediately checked with a secondary source or laboratory control standard prepared from a separate source than those used for calibration. All curves are visually reviewed to ensure that acceptable correlation represents linearity. Calibration curves may be rejected for nonlinearity, abnormal sensitivity, or poor response of the laboratory control standard.

Continuing calibration verification is performed on each day that initial calibration is not performed and following every tenth sample. If a check standard does not perform within established criteria then the instrument will undergo evaluation to determine the problem. Once the problem is corrected, all samples between the last in control sample and the first out of control check will be re-analyzed.

TABLE 8.5: INSTRUMENT CALIBRATION & QC

Analysis/ Instrument	Calibration Type	Number of Standards	Acceptance/ Rejection Criteria	Frequency
TO-15/SIM & Method 18/ GC/MS	Initial/ Continuing	1 - Tuning Solution	Mass m/z Abundance Criteria 50 8-40% of mass 95 75 30-66% of mass 95 95 Base peak, 100% 96 5-9% of mass 95 173 <2% of mass 174 174 50-120% of mass 95 175 4-9% of mass 174 176 >93% but <101% of mass 174 177 5-9% of mass 176	TO-15/SIM/ M-18: Every 24 hours 8260 VAP: Every 12 hours
TO-15/SIM & Method 18/ GC/MS	Initial	5 minimum	Average Response Factor: <30 % RSD with no more than 2 compounds being between 30 and 40 % RSD	As needed
8260B VAP/ GC/MS	Initial	5 minimum	Average Response Factor: Target analytes in the calibration standards must be <15% RSD, CCCs must have a %RSD of less than 30% & SPCCs must meet the minimum average response factors. Linear regression can be used for any target compound exceeding the 15% RSD	As needed
TO-15/SIM & Method 18/ GC/MS	Continuing	1 cal. check verification (CCV)	Percent Difference for all compounds <30%	Daily, when init. calibration is not required.
TO-15 VAP/ GC/MS	Continuing	1 cal. check verification (CCV)	Average Response Factor: Target analytes in the calibration standards must be <15% RSD, CCCs must have a %RSD of less than 20% & SPCCs must meet the minimum average response factors.	Daily, when init. calibration is not required.
TO-15/SIM & Method 18	Initial/ Continuing	1 - Blank	< RL, concentrations of common laboratory contaminants shall not exceed the reporting limit	Following init. calibration or daily cal. verification
TO-15/SIM & Method 18	Initial/ Continuing	2 – (LCS/LCSD)	Must be within +/-30% with an RPD of <25.	Following initial calibration or daily cal. Verification
Landfill Gas/Helium	Initial	3	Average Response Factor: Target analytes in the calibration standards must be <15% RSD. Linear regression can be used for any target compound exceeding the 15% RSD	As needed
Landfill Gas/Helium	Continuing	1 - cal. check verification (CCV)	Target analytes in the calibration standards must be <15% RSD.	Daily, when init. calibration is not required, following every 10th injection, and the end of the sequence.

TABLE 8.5: INSTRUMENT CALIBRATION & QC

Analysis/ Instrument	Calibration Type	Number of Standards	Acceptance/ Rejection Criteria	Frequency
Landfill Gas/Helium	Initial/ Continuing	1 - Blank	< RL, concentrations of common laboratory contaminants shall not exceed the reporting limit	Following init. calibration or daily cal. verification
Landfill Gas/Helium	Initial/ Continuing	2 – Second source (LCS/LCSD)	Must be within +/-30% with an RPD of <25.	Following initial calibration or daily cal. verification
RSK-175	Initial	3	Average Response Factor: Target analytes in the calibration standards must be <15% RSD. Linear regression can be used for any target compound exceeding the 15% RSD	As needed
RSK-175	Continuing	1 - cal. check verification (CCV)	Target analytes in the calibration standards must be <15% RSD.	Daily, when init. calibration is not required, following every 10th injection, and the end of the sequence.
RSK-175	Initial/ Continuing	1 - Blank	< RL, concentrations of common laboratory contaminants shall not exceed the reporting limit	Following init. calibration or daily cal. verification
RSK-175	Initial/ Continuing	2 – Second source (LCS/LCSD)	Must be within +/-30% with an RPD of <25.	Following initial calibration or daily cal. verification
MEETAC	Initial/ Continuing	1 - Tuning Solution	Mass m/z Abundance Criteria 50 15.0-40.0% of mass 95 75 30.0-60.0% of mass 95 95 base peak, 100% relative abundance 96 5.0-9.0% of mass 95 173 < 2.0% of mass 174 174 > 50.0% of mass 95 175 5.0-9.0% of mass 174 176 > 95.0%, but less than 101% of mass 174 177 5.0-9.0% of mass 176	Every 12 hours
MEETAC	Initial	5 minimum	Average Response Factor: Target analytes in the calibration standards must be <15% RSD,	As needed
MEETAC	Continuing	1 cal. check verification (CCV)	Average Response Factor: Target analytes in the calibration standards must be <15% RSD,	Daily, when init. calibration is not required.
MEETAC	Initial/ Continuing	1 - Blank	< RL, concentrations of common laboratory contaminants shall not exceed the reporting limit	Following init. calibration or daily cal. verification

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent Grade water –Type II used in the Air Laboratory is generated in the Microbiology Laboratory and is periodically checked for contamination. Type II water is checked annually for single and total heavy metals. Monthly checks for total organic carbon, ammonia and organic nitrogen, total residual chlorine and a heterotrophic plate count are also conducted. Conductivity and pH are checked continuously or with each use.

9.2 SAMPLER CLEANING AND CERTIFICATION PROCEDURE

Canisters are cleaned in the laboratory using the Entech 3100 4-Position Canister Cleaner. Canisters are cleaned in batches of 4 to 8 per cleaning cycle. Prior to cleaning, canisters are inspected for integrity, damage and visible contamination. Acceptable canisters are connected to the manifold on the Entech cleaner and the cleaning cycle is controlled using Entech SmartLab software. Programmable cleaning cycles include: light, medium and heavy-duty and the cycle selected depends on the previous use of the dirtiest canister being cleaned. The cleaner automatically performs a leak check for the canisters and the manifold prior to the initial evacuation cycle. Heating bands are placed on each canister to elevate the temperature of the metallic canister to a level that provides for efficient cleaning. The typical cleaning cycle parameters are:

	Operating temperature = 120°C
1	Initial evacuation of canister to 1000 mtorr
2	Refill canister to 20psi
3	Evacuate the canister to 1000 mtorr
4	Repeat items 2 & 3 for a minimum of 8 cycles
5	Final zero air pressure in clean canister is 50 mtorr.

Following cleaning, a single canister is selected as a QC sample for the entire batch and the sample is filled with zero air or nitrogen and analyzed to verify that successful cleaning has occurred. If the analysis indicates that the batch is clean (i.e. <0.2 ppbv for target analytes and free of additional contamination), the QC sample is returned to the cleaner manifold. The entire batch is evacuated to less than 50 mtorr and clearly labeled as clean and ready for sample collection. If the QC sample indicates that canister contamination is still present, the batch is recycled through the cleaning process until residual contamination is no longer present. If following repeated cleaning cycles, residual contamination is still observed, canisters may be permanently removed from service and clearly identified as unusable.

Tedlar bags and vials, as used for headspace analyses, are purchased as certified pre-cleaned from approved providers and disposed of following the sample retention period.

9.3 TYPICAL ENTECH AUTOSAMPLER OPERATING PARAMETERS

These parameters are provided as an example and may be modified to improve analytical system performance or better address project needs.

Line Temp = 100°C	Module 2 Desorb = 180°C
Bulk Head 1 = 30°C	Module 2 Bake = 190°C
Bulk Head 2 = 30°C	Module 2 Desorb Time = 3.5 min
Module 1 Trap = -150°C	Module 3 Trap = -180°C
Module 1 Preheat = 20°C	Module 3 Inject = 2 min
Module 1 Desorb = 20°C	Module 3 Bake Time = 2 min
Module 1 Bake = 130°C	Module 3 Event = 3
Module 1 Bake Time = 5 min	Module 3 Wait Time = 25 min.
Module 2 Trap = -30°C	Pressure Comp Factor = 14
Module 2 Preheat = off	Loop Flush = 30 seconds

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the air laboratory can be found in the following table:

TABLE 10.1: AIR DEPARTMENT SOPs

This Table is subject to revision without notice

SOP #	Title/Description
330367	Measurement of Volatile Organic Compound in Ambient Air by GC/MS (EPA TO-15)
330367OH	Measurement of Volatile Organic Compound in Ambient Air by GC/MS (EPA TO-15) (Ohio VAP only)
330368	Gasoline Range Organics in Ambient Air by GC/MS – Method 18 Modified
330370	Method for Determination of Methane, Ethane, and Ethene (Based on RSK-175)
330371	Canister Cleaning, Certification and Storage
330371OH	Canister Cleaning (Ohio Vap Only)
330372	The Analysis of Fixed Gases using GC/TCD
330373	Meetac – Methanol and Ethanol Based on EPA 8260B/C

10.2 Sample Dilutions:

Dilutions for air samples from summa canisters and Tedlar bags may take three forms depending on the level of dilution required. These dilution techniques are demonstrated below:

Autosampler Dilution:

- First, a smaller sample volume can be analyzed using the capabilities of the Entech autosampler. For example, for a standard sample volume of 400cc, if 40cc were analyzed, that would be equivalent to a 10-fold dilution.
- The smallest sample volume that can be accurately analyzed using the autosampler method is l0cc (or a 40x).

Pressurized Manual Dilution:

- Sometimes, a 40X dilution is not sufficient to bring the concentration of a target analyte within the calibration range. In those cases, the sample canister is pressurized resulting in a dilution of the target analytes present.
- The act of introducing more pure air into the canister performs a dilution.
- The canister can then be analyzed at 400cc or diluted using a lesser autosampler volume, if necessary.

Secondary Manual Dilution:

- In extreme cases, the canister may need to be diluted into a second evacuated canister.
- This is accomplished by using a gas tight syringe to remove an aliquot of sample (1-l0mL) from the initial canister then injecting it into a clean evacuated second canister.
- The second canister is then analyzed and quantified taking into account the dilution based on the amount of sample injected and the total volume of the canister utilized.

Tedlar Bag Dilutions:

- Dilutions on Tedlar bags can be performed in much the same manner as summa canisters using either the autosampler dilution or the secondary manual dilution using a second Tedlar bag and filling it with pure air then adding an aliquot of field sample using a gas tight syringe.

11.0 QUALITY CONTROL CHECKS

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

11.1 Initial Demonstrations of Capability (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new method/instrumentation. Continuing Demonstration of Capability (CDOCs) must be updated at least annually for each analyst performing testing on field samples. The associated data is filed within the department and available for review.

11.2 A Laboratory Control Sample (LCS) and LCS Duplicate are analyzed per batch of samples and must yield recoveries within 70-130% of the expected concentration for all analytes and this pair must not exceed and RPD of 25%. Analytes specifically listed in each SOP as poor performers must yield recoveries as listed in each determinative SOP. LCS stock standards are prepared from sources independent of the calibration standards and also serve to verify the original calibration curve.

11.3 A method preparation blank is performed per batch of samples processed. If the acceptance criteria as listed in the determinative SOP is exceeded, the laboratory shall evaluate whether reprocessing of the samples is necessary, based on the following criteria:

- The blank contamination exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated preparation batch or
- The blank contamination is greater than 1/10 of the specified regulatory limit. The concentrations of common laboratory contaminants shall not exceed the reporting limit.

Any samples associated with a blank that fail these criteria shall be reprocessed in a subsequent preparation batch, except when the sample analysis resulted in non-detected results for the failing analytes.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in SOP #030201, *Data Handling and Reporting.* A secondary review of the data package is performed according to ESC SOP #030227, *Data Review*. The reviewer verifies that the analysis has been performed as required and meets method criteria, all associate data is present and complete, and also ensures that any additional documentation is completed as required (i.e. Ohio VAP checklists, required qualifiers on test reports, etc.)

TABLE 12.1 Data Reduction Formulas

PARAMETER	FORMULA
GC/MS – Analyte Response Factor	response of analyte primary ion {*area*} x concentration of analyte (ug/L) response of ISTD primary ion {*area*} x concentration of ISTD (ug/L) *Calculations performed by HP Enviroquant Software*
GC/MS – Sample Analyte Concentration	response of primary ion in analyte x int. std concentration. {*ppbv*} x dilution factor response factor {*area/(mg/ml)*} x initial volume-mass {*ml or g*} x int. std cal. {area} *Calculations performed by HP Enviroquant Software*

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.3 by method for current QC targets and controls and current reporting limits.

Organic Control Limits **-** The organic QC targets are statutory in nature; warning and control limits for organic analyses are initially established for groups of compounds based on preliminary method validation data. When additional data becomes available, the QC targets are reviewed. All QC targets are routinely re-evaluated at least annually (and updated, if necessary) against laboratory historical data to insure that the limits continue to reflect realistic, method achievable goals.

12.3 REPORTING

Reporting procedures are documented in SOP #030201, *Data Handling and Reporting.*

Table 12.3: QC Targets for Air Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Method	Matrix	Accuracy (%)	Prec. (% RPD)	RL	Unit
1,1,1-Trichloroethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,1,2,2-Tetrachloroethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,1,2-Trichloroethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,1-Dichloroethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,1-Dichloroethene	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,2,4-Trichlorobenzene	TO-15	Air	53.6-154	25.0	0.63	ppbv
1,2,4-Trimethylbenzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,2-Dibromoethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,2-Dichlorobenzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,2-Dichloroethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,2-Dichloropropane	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,3,5-Trimethylbenzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,3-Butadiene	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,3-Dichlorobenzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,4-Dichlorobenzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,4-Dioxane	TO-15	Air	48.0-156	25.0	0.2	ppbv
1,1,1-Trichloroethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
2,2,4-Trimethylpentane	TO-15	Air	70.0-130	25.0	0.2	ppbv
2-Chlorotoluene	TO-15	Air	70.0-130	25.0	0.2	ppbv

Table 12.3: QC Targets for Air Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Method	Matrix	Accuracy (%)	Prec. (% RPD)	RL	Unit
2-Propanol	TO-15	Air	50.4-152	25.0	0.2	ppbv
4-Ethyltoluene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Acetone	TO-15	Air	70.0-130	25.0	1.25	ppbv
Allyl Chloride	TO-15	Air	70.0-130	25.0	0.2	ppbv
Benzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Benzyl Chloride	TO-15	Air	55.6-160	25.0	0.2	ppbv
Bromomethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
Bromodichloromethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
Bromoform	TO-15	Air	70.0-130	25.0	0.6	ppbv
Carbon Disulfide	TO-15	Air	70.0-130	25.0	0.2	ppbv
Carbon Tetrachloride	TO-15	Air	70.0-130	25.0	0.2	ppbv
Chlorobenzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Chloroethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
Chloroform	TO-15	Air	70.0-130	25.0	0.2	ppbv
Chloromethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
Cis-1,2-Dichloroethene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Cis-1,3-Dichloropropene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Cyclohexane	TO-15	Air	70.0-130	25.0	0.2	ppbv
Dibromochloromethane	TO-15	Air	70.0-130	25.0	0.2	ppbv
Dichlorodifluoromethane	TO-15	Air	56.7-140	25.0	0.2	ppbv
Ethanol	TO-15	Air	34.3-167	25.0	0.63	ppbv
Ethyl Acetate	TO-15	Air	70.0-130	25.0	0.2	ppbv
Ethylbenzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Freon-11	TO-15	Air	70.0-130	25.0	0.2	ppbv
Freon-12	TO-15	Air	70.0-130	25.0	0.2	ppbv
Freon-113	TO-15	Air	70.0-130	25.0	0.2	ppbv
Freon-114	TO-15	Air	70.0-130	25.0	0.2	ppbv
Gasoline Range Organics	TO-15	Air	70.0-130	25.0	50	ppbv
Heptane	TO-15	Air	70.0-130	25.0	0.2	ppbv
Hexachloro-1,3-Butadiene	TO-15	Air	62.1-143	25.0	0.63	ppbv
Hexane	TO-15	Air	70.0-130	25.0	0.2	ppbv
Isopropylbenzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
M&P-Xylene	TO-15	Air	70.0-130	25.0	0.4	ppbv
Methyl Butyl Ketone	TO-15	Air	47.9-165	25.0	1.25	ppbv
Methyl Ethyl Ketone	TO-15	Air	70.0-130	25.0	1.25	ppbv

Table 12.3: QC Targets for Air Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Method	Matrix	Accuracy (%)	Prec. (% RPD)	RL	Unit
Methyl Isobutyl Ketone	TO-15	Air	55.3-154	25.0	1.25	ppbv
Methyl Methacrylate	TO-15	Air	70.0-130	25.0	0.2	ppbv
Methyl tert Butyl Ether	TO-15	Air	70.0-130	25.0	0.31	ppbv
Methylene Chloride	TO-15	Air	70.0-130	25.0	0.63	ppbv
Naphthalene	TO-15	Air	52.0-158	25.0	0.63	ppbv
N-butyl benzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
N-propyl benzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
o-Xylene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Propene	TO-15	Air	53.9-143	25.0	0.4	ppbv
Sec-butyl benzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Styrene	TO-15	Air	70.0-130	25.0	0.2	ppbv
t-Butyl Alcohol	TO-15	Air	70.0-130	25.0	0.2	ppbv
Tert-butyl benzene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Tetrachloroethylene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Tetrahydrofuran	TO-15	Air	65.0-140	25.0	0.2	ppbv
Toluene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Trans-1,3-Dichloropropene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Trans-1,2-Dichloroethene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Trichloroethylene	TO-15	Air	70.0-130	25.0	0.2	ppbv
Vinyl Acetate	TO-15	Air	70.0-130	25.0	0.2	ppbv
Vinyl Bromide	TO-15	Air	70.0-130	25.0	0.2	ppbv
Vinyl Chloride	TO-15	Air	70.0-130	25.0	0.2	ppbv
1,1,1-Trichloroethane	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
1,1,2,2-Tetrachloroethane	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
1,1,2-Trichloroethane	TO-15SIM	Air	70.0-130	25.0	0.03	ppbv
1,1-Dichloroethane	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
1,1-Dichloroethene	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
1,2-Dibromoethane	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
1,2-Dichloropropane	TO-15SIM	Air	70.0-130	25.0	0.03	ppbv
1,4-Dichlorobenzene	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
Benzene	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
Carbon Tetrachloride	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
Chloroethane	TO-15SIM	Air	70.0-130	25.0	0.04	ppbv
Chloroform	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
Chloromethane	TO-15SIM	Air	70.0-130	25.0	0.03	ppbv

Table 12.3: QC Targets for Air Accuracy (LCS), Precision and RLs
This table is subject to revision without notice

Analyte	Method	Matrix	Accuracy (%)	Prec. (% RPD)	RL	Unit
Cis-1,2-Dichloroethene	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
Cis-1,3-Dichloropropene	TO-15SIM	Air	70.0-130	25.0	0.03	ppbv
Ethylbenzene	TO-15SIM	Air	70.0-130	25.0	0.03	ppbv
Tetrachloroethylene	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
Trans-1,3-Dichloropropene	TO-15SIM	Air	70.0-130	25.0	0.03	ppbv
Trans-1,2-Dichloroethene	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
Trichloroethylene	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
Vinyl Acetate	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
Vinyl Chloride	TO-15SIM	Air	70.0-130	25.0	0.02	ppbv
Methane	RSK-175	Air/ Headspace	85.0-115	20.0	0.01	ppmv
Ethane	RSK-175	Air/ Headspace	85.0-115	20.0	0.0129	ppbmv
Ethene	RSK-175	Air/ Headspace	85.0-115	20.0	0.0127	ppmv
Propane	RSK-175	Air/ Headspace	85.0-115	20.0	0.0186	ppmv
Acetylene	RSK-175	Air/ Headspace	85.0-115	20.0	0.0208	ppmv
Carbon Dioxide	ASTM D1946	Air	70.0-130	20.0	0.50 / 200	% / ppmv
Carbon Monoxide	ASTM D1946	Air	70.0-130	20.0	0.50 / 200	% / ppmv
Methane	ASTM D1946	Air	70.0-130	20.0	0.50 / 200	% / ppmv
Nitrogen	ASTM D1946	Air	70.0-130	20.0	0.50 / 200	% / ppmv
Oxygen	ASTM D1946	Air	70.0-130	20.0	0.50 / 200	% / ppmv
Helium	ASTM D1946	Air	70.0-130	25.0	100	ppmv
Methanol	MEETAC	Water/Soil	70.0-130	20.0	20.0/100	ppb / ppm
Ethanol	MEETAC	Water/Soil	70.0-130	20.0	20.0/100	ppb / ppm

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CARs are kept on file by the Regulatory Affairs Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these limits are exceeded, corrective action must be taken. Calculated sample spike control limits are also used.

All samples and procedures are governed by ESC's quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory, the method criteria takes precedence.

13.2.2 Calibration Verification Criteria Are Not Met.

Rejection Criteria – See Table 8.5.

Corrective Action – Instrument settings are checked. The standard is reviewed for obvious cause. The standard may require re-analysis or the instrument may require recalibration.

13.2.3 Out Of Control Blanks:

Rejection Criteria - Blank reading is more than ½ the RL.

Corrective Action - Instrument settings are checked. The Blank is re-analyzed. If the blank is still out of control, bakeout of the system is performed and the blank is re-analyzed.

13.2.4 Out Of Control Laboratory Control Standards (LCS)

Rejection Criteria - If the performance is outside of lab-generated control (Listed in Table 12.3).

Corrective Action - Instrument settings are checked. The LCS standard is re-analyzed. If the LCS is still out of control, re-calibration is performed, and samples affected since the last in control reference standard are re-analyzed.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #030230, *Standards Logger, SOP #030227, Data Review* and SOP #030201, *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 13.0 and in *SOP #010104, Internal Audits*.

16.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix VIII)	General – Replaced the term “client” with the term “customer” and added TO-15SIM Table 8.1 – Updated Equipment List Tables 8.3A and 8.3B – Updated standards Table 10.1 – Updated SOP List

1.0 SIGNATORY APPROVALS

Aquatic Toxicity Laboratory
QUALITY ASSURANCE MANUAL

APPENDIX IX TO THE ESC
QUALITY ASSURANCE MANUAL

for

ESC LAB SCIENCES
12065 LEBANON ROAD
MT. JULIET, TENNESSEE 37122
(615) 758-5858

Prepared by

ESC LAB SCIENCES
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NOTE: The QAM has been approved by the following people.

Eric Johnson, B.S., Director of Operations 615-773-9654

Jim Brownfield, B.S., Compliance Director 615-773-9681

Steve Miller, B.S., Quality Assurance Director, 615-773-9684

Christabel Fernandes-Monteiro, PhD., Biology Department Manager, 615-773-9683

2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that analytical data generated from the Aquatic Toxicity laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in non-conforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the customer with both routine and specialized services, field sampling guidance and materials and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Dr. Christabel Fernandes-Monteiro, with a Ph.D. in Applied Biology, is the Department Manager of Biology. She oversees supervision of laboratory operations in the Mold, Aquatic Toxicity, Microbiology, Protozoan and BOD laboratories. Her responsibilities include assurance of reliable data through monitoring of quality control, corroborating the analysis performed, protocol development, coordination with customers regarding sample analysis, scheduling of tests and overall production in all sections within the Biology Laboratory, including management of staff. In her absence, Shain Schmitt assumes her responsibilities in the Aquatic Toxicity laboratory.

Shain Schmitt with a B.S. degree in Conservation Biology, is the Primary Analyst for the Aquatic Toxicity laboratory. Mr. Schmitt is proficient in aquatic toxicity analytical methods and is responsible for sample analysis, review and approval of data associated with toxicity analyses. His responsibilities also include the coordination with customers regarding sample analysis, scheduling, data reductions, interpretation and validation of toxicity testing. In his absence, Brandon Etheridge assumes his responsibilities.

5.2 TRAINING

All new analysts to the laboratory are trained by the Primary Analyst or Manager according to ESC protocol. ESC's training program is outlined in *SOP 350355 Technical Training and Personnel Qualification for Biology–Aquatic Toxicity.* Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in toxicity analysis is also demonstrated by acceptable participation in the Phenova proficiency testing

program (PTs) as well as by performing routine reference toxicant testing at the same concentrations and in the same dilution water as is used for field sample testing. Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the laboratory has approximately 1440 square feet of area with roughly 280 square feet of bench area. There are 300 square feet of additional storage and the lighting is fluorescence. The air system is a five-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the Siemans Elga UltraPure deionizer system. Biohazard containers are located in the laboratory and Stericycle Waste Removal serves as ESC's biological waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- The following Biosafety Level 2 (BSL2) guidelines are adhered to:
  - Closed-toe shoes are worn in the laboratory
  - Floors and work surfaces are cleaned on a regular basis
  - Emergency numbers are posted in the laboratory
  - Laboratory personnel are trained in the use of the biological spill kit and emergency safety equipment
- ESC's laboratory safety guidelines are detailed in the ESC *Chemical Hygiene Plan*.

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedures are described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Samples are received in the laboratory login area and are tracked using LIMS (Laboratory Information Management System). A Chain of Custody Form accompanies all samples and can be viewed in LIMS. This is necessary to prove the traceability of the samples and to document the change in possession from sampling to delivery to receipt by the laboratory. Prior to analysis samples are checked for integrity. Once samples are checked to confirm integrity, the samples are logged with unique sample identification information and a label is affixed to each container. Chronic Toxicity samples are uniquely identified with "sample 1, sample 2 and sample 3". A sample custodian then transports samples to the laboratory. Sample handling and tracking procedures are outlined in *SOP 060105, Sample Receiving.*

- Samples for Chronic and Acute toxicity testing are collected in either 1 Gal HDPE or glass containers with no preservative and 125 ml HDPE without preservative for Alkalinity and with preservative for Hardness. Holding time is 36 hours between collection and first use of sample and last use of sample for renewal shall not exceed 72 hours without permission from permitting authority.
- Requirements for sample acceptance are located in *SOP 060105, Sample Receiving.* At a minimum, the following physical and chemical parameters are analyzed for each sample received:

  - Temperature
  - pH - initial and final measurements recorded
  - D.O. - initial and final measurements recorded
  - Specific Conductance
  - Alkalinity
  - Hardness
  - Total Residual Chlorine
- Samples must be immediately cooled and maintained at 0-6^{o}C following sampling, during shipment and prior to testing.

Residual Chlorine Treatment

- Residual chlorine in biomonitoring samples is monitored using a pocket colorimeter and these checks are documented. Chlorine removal is not performed on submitted field samples.

Dissolved Oxygen

For acute tests, samples that are $\leq$ 4.0mg/L are aerated until the sample reaches 90% saturation. For chronic tests, samples that are $\leq$ 5.0 mg/L are aerated until the sample reaches 90% saturation.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

TABLE 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Aquatic Toxicity Lab
This table is subject to revision without notice.

Item	*Manufacturer*	*Model*	*Location*
Analytical Balance	Mettler	AT261 Delta Range	Aquatic Tox Lab
Class "I" weights (2)	Troemner		Aquatic Tox Lab
Conductivity Meter	Orion	150 A+	Aquatic Tox Lab
Dissolved Oxygen Meter	YSI	Model 50	Aquatic Tox Lab
Stereoscope	Olympus	SZX-IllK100	Aquatic Tox Lab
Oven (1)	Fisher	655F	Aquatic Tox Lab
Incubator	Thermo-Kool	Environmental chamber	Aquatic Tox Lab

TABLE 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Aquatic Toxicity Lab *This table is subject to revision without notice.*			
Item	***Manufacturer***	***Model***	***Location***
Incubator	Percival Scientific	1-37 VL	Aquatic Tox Lab
Incubator	Precision Sci.	818	Aquatic Tox Lab
Incubator (2)	Precision Sci.	818	Aquatic Tox Lab
Incubator (3)	VWR	2030-ZZMFG	Aquatic Tox Lab
Microscope	Olympus	CHT	Aquatic Tox Lab
pH Meter	Orion	VersaStar	Aquatic Tox Lab
Refrigerator (2)	Beverage Air	E Series	Aquatic Tox Lab
Stereoscope	Olympus	SZH-ILLD	Aquatic Tox Lab
Stereoscope	Olympus	SZH-ILLD	Aquatic Tox Lab
Refrigerator	Frigidaire	FRC445GB	Aquatic Tox Lab
Refrigerator	True	T-49	Aquatic Tox Lab
Water Purifier	Siemans	Elga LabPure S4	Aquatic Tox Lab
Refrigerator	Fridgidaire	FRC 445GB	Aquatic Tox Lab
pH/Conductivity Benchtop meter	Thermo Scientific Orion	VSTAR 52	Aquatic Tox Lab
RDO Probe	Thermo Scientific Orion	VSTAR-RD	Aquatic Tox Lab
Oven (2)	Thermoscientific	Heratherm OGS400	Aquatic Tox Lab
Stereoscope	Olympus	SZH-STS	Aquatic Tox Lab
Freezer	Kenmore	198.813.582	Aquatic Tox Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

PREVENTATIVE MAINTENANCE FOR LABORATORY EQUIPMENT		
INSTRUMENT	***P. M. DESCRIPTION***	***FREQUENCY***
Analytical Balances	•Check with Class "I" weights	Daily-tolerance 1 gm - ±0.0001 gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	10 gm - ±0.01 gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semi-annually
Refrigerators & Incubators	•Maintenance service	As needed - determined by twice daily temperature performance checks @ least 4 hours apart
Dissolved oxygen meter	•Calibrate with each use	Daily
Dissolved oxygen meter	•Change probe membrane	Every two to four weeks when in use
Conductivity Meter	•Check probe cables	As needed
Conductivity Meter	•Clean probe	As needed
Conductivity Meter	•Replace or replatinize probe	Poor response not corrected by above
Conductivity Meter	•Calibrate with each use	Daily (or prior to each use)
Microscope/Stereoscope	•Service/calibration of each ocular micrometer	Annually

PREVENTATIVE MAINTENANCE FOR LABORATORY EQUIPMENT		
INSTRUMENT	***P. M. DESCRIPTION***	***FREQUENCY***
Microscope/Stereoscope	• Clean optics and stage	As needed
pH Meters	•Reference junction & electrode replacement	As needed
pH Meters	•Probe stored in pH standard 4	At all times when not in use
pH Meters	•Other	As described in the manufacturer's manual
pH Meters	•Calibrate with each use	Daily (or prior to each use)
pH meter	•ATC checks	Quarterly
Bottle top dispenser/repipettor	•Calibrate	Quarterly
Bottle top dispenser/repipettor	•Clean to prevent residue buildup	As needed
Water Purifier	Tank Exchange, UV bulb and sleeve replacement (service contract maintenance and check	As needed and annually
Water Purifier	•Replace cartridge and filter	As needed and semi-annual
RDO probe	•Replace sensor cap	Annually
RDO probe	•Clean sensor cap	As needed
RDO probe	•Other	As described in manufacturer's manual
pH/Conductivity/DO meter	•Calibrate with each use	Daily
Light Meter	•Calibrate	Annually

8.3 STANDARDS , REAGENTS AND ORGANISM CULTURES

All reagents and standards must meet the requirements listed in the analytical methods.

Table 8.3A: Stock solution sources, description and related information.
(subject to revision as needed)

Description	Vendor	Storage Req.	Expiration
Conductivity standard 1413	NSI	Ambient	1 yr
pH buffer 4	-VWR	Ambient	1 yr
pH buffer 7	-VWR	Ambient	1 yr
pH buffer 10	-VWR	Ambient	1 yr
Bromothymol blue solution	-VWR	Ambient	1 yr
Potassium phosphate monobasic	-VWR	Ambient	1 yr
Magnesium chloride	-VWR	Ambient in dessicator	1 yr
Potassium Chloride	-VWR	Ambient in dessicator	1 yr
Brine shrimp eggs	Brine Shrimp Direct (BSD)	Ambient, tightly sealed.	1 yr
Calcium sulfate	-VWR	Ambient in dessicator	1 yr
EDTA	-VWR	Ambient in dessicator	1 yr
Sodium thiosulfate	-VWR	Ambient in dessicator	1 yr
pH buffer 4	-VWR	Ambient.	1 yr
YCT	Made in-house	-10 to -20^{o}C	14 days after thawing
Raphidocelis subcapitata	Aq. Biosystems	1-6^{o}C	One month from concentration date

Table 8.3A: Stock solution sources, description and related information. *(subject to revision as needed)*			
Description	**Vendor**	**Storage Req.**	**Expiration**
Vitamin B12	ICN	1-6°C	NA

TABLE 8.3B: Working Solution Descriptions and Related Information. ***(subject to change)***			
Solution	**Concentrations**	**Storage Requirements**	**Expiration**
KCl stock solution	31.237g KCl to 2L of mod. Hard SDW	1-4°C	14 days
B12 Solution	0.01125g to 1L of DI Water	1-4°C	NA

Source and Maintenance of in-house cultures:

Source of Biological Organisms (*subject to change*):
The primary source for all fathead minnows is:

Aquatic Biosystems Inc.
2821 Remington Street
Fort Collins, CO 80525

The source for their organisms is documented on each packing slip received. ESC accepts the packing slip as documentation and verification by the supplier with regard to the taxonomic identification of the bioassay species. The packing slips for bioassay test organisms are kept on file.

The amount of food added to culture vessels depends upon the number of organisms within a given culture. As standard procedure, *Ceriodaphnia dubia* batch cultures are fed 4.5mL of Yeast Cereal leaves, Tout chow (YCT) and *Raphidocelis subcapitata* algal suspension on the day of initiation. Batches are fed as needed. The date, time and the amount the organisms are fed is documented. All yeast purchased is at least food grade and has passed FDA standards. All (YCT) Yeast Trout Chow is made in-house. New lots are tested for pesticides, metals, and PCBs.

Ceriodaphnia dubia, fresh batch cultures are set up on Monday, Wednesday and Friday using newly hatched neonates less than 24 hours old. In addition, a minimum of 4 brood trays are set up daily in order to guarantee organisms of the right age to use in bioassay tests. The *C. dubia* brood trays are fed daily. The *C. dubia* are transferred into fresh water daily after their first brood of neonates is born. Third generation neonates, less than 24 hours old, are used for batch cultures and brood trays. Third generation neonates, less than 24 hours old and hatched within 8 hours of each other, are used for chronic tests. Adults are used as sources for neonates until 14 days of age.

C. dubia are taxonomically identified to species on a quarterly basis. All taxonomy information is documented and kept on file for a year.

Pimephales promelas batch cultures are cleaned as needed by siphoning off the excess food and waste from the bottom of the culture vessel and renewing the water. Cultures are aerated as needed to maintain adequate dissolved oxygen.

Pimephales promelas are taxonomically identified to species on a quarterly basis. All taxonomy information is documented and kept on file for a year.

The water used for culturing is moderately hard synthetic dilution water (SDW) and is prepared by diluting 1L synthetic freshwater concentrate to 20 L ultra-pure deionized water, and vigorously aerating for a minimum of 1 hour. The physical and chemical parameters for each new tank of water prepared are recorded and should fall within the following acceptable range:

1. pH – 7.5- 8.5 units
2. D.O. - greater than 80% saturation in mg/L
3. Specific Conductance - ~250 micromhos/cm
4. Alkalinity - 57-64 mg $CaCO_3$/L
5. Hardness - 80 to 100 mg $CaCO_3$/L
6. Total Residual Chlorine - <0.1 mg/L

8.4 INSTRUMENT CALIBRATION

Lighting

All testing and culturing is maintained in incubators in which temperature is constant and the photoperiod is on a 16-hour light/8-hour dark cycle. The photoperiod is verified and documented quarterly. The light intensity must be within 50 – 100 foot candles (approximately 10-20uE/m^2/s) and is verified and documented quarterly. All incubators are monitored at least weekly for proper light intensity.

pH Meter

The pH meters are calibrated with each use according to manufacturer's instructions. The slope is documented on a daily basis. Ensure the acceptable pH slope range is within the manufacturer's acceptable range prior to use. Perform automatic temperature compensation (ATC) checks quarterly on the pH probe. All calibration information is documented.

Volumetric Equipment

Equipment such as filter funnels, bottles, pipettes, non-Class A and other containers with graduations are calibrated once per lot prior to first use. The error of calibration must not exceed 3.0%.

Analytical Balance

Analytical balances are checked and calibrated semi-annually by a certified technician. Calibration is checked before each use with Class I weights. Class I weights are calibrated annually.

Stereoscope

Maintenance is performed by a trained technician on an annual basis.

Conductivity Meter

The conductivity meter is calibrated with each use according to manufacturer's instructions.

Dissolved Oxygen Meter

The DO meter is calibrated according to manufacturer's instructions with each use. The electrochemical probe membrane is changed every two to four weeks to maintain accurate readings when in use. The RDO probe sensor cap is cleaned regularly, and replaced once per year. The RDO probe sensor cap must be stored in a moist environment.

Test Chambers

Each test chamber is rinsed with DI water prior to introducing the test organisms.

Bottle Top Dispenser/Repipettor

Repipettors are calibrated quarterly to ensure the instrument is dispensing the correct amount. Periodic cleaning is performed to maintain the accuracy and to prevent buildup of residue.

Colorimeter Chlorine tester

The colorimeter is calibrated before each use using standards to verify accuracy.

Light Meter

Calibrate the light meter annually to ensure it meets original performance specifications or purchase new calibrated meter as needed.

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Deionized water or reverse-osmosis produces water free from bactericidal and inhibitory substances and is used in the preparation of media, solutions and buffers. The quality of the water is monitored for chlorine residual, specific conductance, and heterotrophic bacteria plate count monthly (when in use), when maintenance is performed on the water treatment system, or at startup after a period of disuse longer than one month.

Analysis for metals and organic contaminants is performed quarterly and the Bacteriological Water Quality Test (to determine presence of toxic agents or growth promoting substances) is performed annually. Results of these analyses meet the specifications of the required method and records of analyses are maintained for five years. (An exception to performing the Bacteriological Water Quality Test can be given to laboratories that can supply documentation to show that their water source meets the criteria, as specified by the method, for Type I or Type II reagent water.)

9.2 PH BUFFERS/CONDUCTIVITY STANDARDS

pH buffer and conductivity standard aliquots are used only once. Reagents containers are dated upon receipt and the date opened.

9.3 SECONDARY STANDARDS

Standards are used for retrieval and verification of the factory calibrated colorimeter and are used to verify consistent instrument calibration.

9.4 LABORATORY CONTROL WATER

Control water (moderately hard synthetic dilution water- SDW) is prepared by diluting 1L of synthetic freshwater concentrate to 20L deionized water and aerating for a minimum of 1 hour. The physical and chemical parameters for each new tank of water prepared are recorded and should fall within the following acceptable range:

1. pH – 7.5-8.5 units
2. D.O. - greater than 80% saturation in mg/L
3. Specific Conductance - ~250 micromhos/cm
4. Alkalinity - 57 to 64 mg $CaCO_3$/L
5. Hardness - 80 to 100 mg $CaCO_3$/L
6. Total Residual Chlorine - <0.1 mg/L

Control water (10% dilute mineral water-DMW) is prepared by diluting approximately 2 Liters of Perrier to the 20 Liters mark of a 20 L NALGENE® carboy with ultra-pure

deionized water and aerating for a minimum of 1 hour. The physical and chemical parameters for each new tank of water prepared are recorded and should fall within the following acceptable range:

1. pH – 6.5 to 8.5 units
2. D.O. - greater than 80% saturation in mg/L
3. Specific Conductance - ~95 micromhos/cm
4. Alkalinity - 60 to 70mg $CaCO_3$/L
5. Hardness - 30 to 50mg $CaCO_3$/L
6. Total Residual Chlorine - <0.1mg/L

A given batch of control water is not used for more than 14 days following preparation.

9.5 BRINE SHRIMP

Artemia cysts are certified brine shrimp eggs from Brine Shrimp Direct To determine the quality of the new lots of Brine shrimp, a side-by-side comparison test is performed using the new food and the food of known acceptable quality.

9.6 YCT

YCT-Yeast Cereal leaves and Trout chow is prepared in the laboratory. To determine the quality of the new lots of YCT a side-by-side comparison test is performed using the new food and the food of known acceptable quality.

9.7 ALGAE

Algae- *Raphidocelis subcapitata* are commercially prepared. Upon arrival, each batch received has an accompanying Certificate of Algae Preparation History. The certificate provides the following quality control data: date prepared, species name, inoculation date, harvest date, concentration date and cell count.

9.8 GLASSWARE WASHING, STERILIZATION PROCEDURES AND EQUIPMENT STERILITY CHECKS

Glassware washing and preparation/sterilization procedures are performed according to EPA guidelines and are outlined in *SOP 030701 Glassware Cleaning* and *SOP 350335, Quality Control and Quality Assurance of Microbiological Equipment and Testing Materials.* Before use, examine and discard items with chipped edges or etched inner surfaces. Reusable glassware is cleaned using the following protocol:

- Soak for 15 minutes in hot tap water with detergent and scrub. Rinse thoroughly with tap water. Rinse thoroughly with dilute nitric acid (10%). Rinse thoroughly with deionized water. Rinse thoroughly with pesticide grade acetone. Rinse well with deionized water.

- New glassware is cleaned according to the same procedure as listed above except the first step is preceded by soaking overnight in 10 % HNO_3.

Inspect glassware after washing for excessive water beading and rewash, if necessary. Perform checks on pH and test for inhibitory residues on glassware and plastic ware. Use utensils and containers of borosilicate glass, stainless steel, aluminum, or other corrosion resistant material for media preparation. All biological glassware is purchased pre-sterilized. In-house sterilization of any auxiliary equipment is performed via autoclave.

Pipettes of all sizes are checked for sterility by drawing up non-selective media into the pipette and re-dispensing the volume back into original tube that contained the media. The tube is then incubated and monitored for growth. All results are recorded and maintained within the laboratory.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the Aquatic Toxicity laboratory can be found in the following table:

TABLE 10.1: AQUATIC TOXICITY DEPARTMENT SOPs
This Table is subject to revision without notice

SOP #	Title/Description
340312	Dissolved Oxygen Membrane Electrode Method
350301	Fathead Minnow, *Pimephales promelas*, Larval Survival and Growth Test, EPA Method 1000.0
350302	Cladoceran, *Ceriodaphnia dubia*, Chronic Survival and Reproduction Test, EPA Method 1002.0
350303	*Pimephales promelas* Acute Toxicity Testing, EPA Method 2000.0
350303NC	North Carolina *Pimephales promelas* Acute Toxicity Testing
350304	*Ceriodaphnia dubia* Acute Toxicity Testing EPA Method 2002.0
350304NC	North Carolina *Ceriodaphnia dubia* Acute Toxicity Testing
350317	WET Reference toxicant testing
350318	Mini Chronic *C. dubia* NC
350320	Acceptability Test for New Food Batches for WET Testing
350321	Pocket Colorimeter Chlorine Tester Maintenance and Calibration
350322	DO Meter Maintenance and Calibration
350323	Fluke Thermometer Operation and Maintenance
350324	Digital Light Meter Maintenance and Method of Operation
350325	pH Meter Maintenance and Calibration
350326	Thermometer Operation, Maintenance and Calibration Procedure
350327	Bottle Top Dispenser Maintenance and Method of Operation
350328	Conductivity Meter Maintenance and Calibration
350329	Taxonomic Verification/Identification of *Pimephales promelas* - Fathead Minnow
350330	Taxonomic Verification/Identification of *Ceriodaphnia dubia*
350345	Receipt and Maintenance of *Pimephalas Promelas* (Fathead Minnow)
350346	Ceriodaphnia Dubia Culture Maintenance, Food Preparation, and Food Maintenance
350355	Technical Training and Personnel Qualifications for Biomonitoring-Aquatic

SOP #	Title/Description
	Toxicity, Mold and Microbiology
350356	Water Bath and Incubator Temperature Stability and Load Testing
350362	Analytical Balance Operation and Verification in the Aquatic Toxicity Microbiology Lab
350364	North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure for Ceriodaphnia dubia

10.2 Additional information regarding Aquatic Toxicity testing can be found in:

Method Resources: EPA/821/R-02/013, EPA/821/R-02/012

- 7-Day Fathead Minnow (*Pimephales promelas*) Larval Survival and Growth Test; Test Method 1000.0 from "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA 821-R-02-013).
- 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test; Test Method 1002.0 from "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA 821-R-02-013).
- Fathead Minnow (*Pimephales promelas*) Acute Toxicity Test (24, 48 or 96 hour duration); referenced in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA 821-R-02-012, 10-02).
- *Ceriodaphnia dubia* Acute Toxicity Test (24, 48 or 96 hour duration); referenced in “Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms” (EPA 821-R-02-012, 10-02)

11.0 QUALITY CONTROL CHECKS

11.1 At a minimum, the following physical and chemical parameters are analyzed for each biomonitoring sample received:

- Temperature - recorded up to twice daily.
- pH - initial and final measurements recorded
- D.O. - initial and final measurements recorded
- Specific Conductance
- Alkalinity
- Hardness
- Total Residual Chlorine

11.2 FEEDING REGIME

- 7-Day Fathead Minnow Larval Survival and Growth Test - Test organisms are fed 0.15mL, per container of 10 organisms. Newly hatched brine shrimp (*Artemia*) are fed to minnow batches 2-3 times daily. Batch cultures are fed depending on organism density.

- 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test - test organisms are fed 0.15mL of Yeast, Cereal leaves, Trout chow (YCT) and 0.15mL *Raphidocelis subcapitata* algal suspension once daily.
- 24 and 48 Hour Acute Toxicity Tests - organisms are fed 2-5 hours prior to introduction into sample but are not fed for the duration of the test.
- 96-Hour Acute Toxicity Tests – organisms are fed at the 48 hour renewal period.
- 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test for North Carolina - test organisms are fed .05mL of YCT/15mL test solution and .05 Raphidocelis subcapitata algal concentrate once daily (1.7x10 to the 7th power cells/mL).

11.3 BATCH CULTURES

Batch cultures are identified by date set up or date received. The set-up date is recorded for each batch.

Ceriodaphnia dubia, fresh batch cultures are set up on Monday, Wednesday and Friday using newly hatched neonates less than 24 hours old. In addition, a minimum of 4 brood trays are set up daily in order to guarantee organisms of the right age to use in bioassays. Condition of cultures is monitored daily and documented in the daily log. The *C. dubia* brood trays are fed daily. The *C. dubia* are transferred into fresh water daily after their first brood of neonates is born. Third generation neonates, less than 24 hours old, are used for batch cultures and brood trays. Third generation neonates, less than 24 hours old and hatched within 8 hours of each other, are used for chronic tests. Adults are used as sources for neonates until 14 days of age.

Pimephales promelas, organisms less than 36 hours old are obtained from a commercial supplier and are used immediately for chronic bioassays. Upon receipt, temperature, conductivity, pH, alkalinity and hardness are recorded and the organisms are slowly acclimated to a temperature of 25°C. If more than 10% mortality has occurred in the batch shipment, the batch is rejected and supplier is contacted. The date of the batch culture is recorded and batches are maintained for 14 days after receipt to use in acute tests. Batch cultures are monitored and fed daily. The number of organisms used is recorded in the daily log. Lots are cleaned as needed by siphoning off the excess food and waste from the bottom of the vessel and renewing the water. Minnow lots are aerated to maintain adequate dissolved oxygen. *Pimephales promelas* lots are fed 2.5 mL of newly-hatched brine shrimp per batch, 2-3 times daily. The date, time and the amount the organisms are fed are documented.

11.4 REFERENCE TOXICANT

The reference toxicant used at ESC is potassium chloride. Acute and chronic reference toxicant tests are performed at a minimum of once monthly and upper and lower control limits have been established.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in *SOP 030201 Data Handling and Reporting.* The primary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP has been followed
- Sample preparation is correct and complete
- Analytical results are correct and complete
- QC is within criteria and complete

All calculations are performed according to the EPA methods manual. When applicable, software is used to perform statistical analysis. All formulae are chosen appropriately depending on the conditions and outcome of each individual test. Due to the complexity of each formula please see EPA/821/R-02/013 for formulae pertaining to Chronic Toxicity tests and EPA/821/R-02/012 for formulae pertaining to Acute Toxicity tests.

TABLE 12.1 Data Reduction Formulas

PARAMETER	FORMULA
IC25, NOEC, LC50, AEC	Toxcalc 5.0 Software

For chronic tests the PMSD and the % CV is calculated and reported.

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by reviewing all data entries and calculations for errors, reviewing all documentation to assure that sample information is correct, and that the tests have been performed appropriately and within the appropriate holding times. The secondary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP has been followed
- Sample preparation is correct and complete
- Analytical results are correct and complete

12.3 REPORTING

Reporting procedures are documented in *SOP 030201 Data Handling and Reporting* and *SOP 030227, Data Review.*

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CARs are kept on file by the Regulatory Affairs Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

All samples and procedures are governed by ESC's quality assurance program. Designated corrective actions are as follows:

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria takes precedence.

13.2.2 Out of control acute toxicity tests.

Rejection Criteria –More than 10% mortality occurs in the control organisms within the specified time frame of the test.

Corrective Action – The test is considered invalid and must be repeated using fresh control water and fresh sample.

13.2.3 Out of control 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test.

Rejection Criteria – If more than 10% mortality occurs in the control organisms within 96 hours or more than 20% mortality occurs in the test organisms in the 3-brood period (approx. 7 days)

Corrective Action – The test is considered invalid and must be repeated using fresh control water and fresh sample.

13.2.4 Out of control 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test.

Rejection Criteria – If the average number of young produced in the control is less than 15 per organism

Corrective Action – The test is considered invalid and must be repeated using fresh control water and fresh sample.

13.2.5 Out of control 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test.

Rejection Criteria – A test is considered invalid if less than 60% (80% for NC tests) of the original number of adult daphnia loaded do not produce three broods within an eight day maximum (7 day maximum for NC tests).

Corrective Action – The test is considered invalid and must be repeated using fresh control water and fresh sample.

13.2.6 Out of control 7-Day *Pimephales promelas* Larval Survival and Growth Test.

Rejection Criteria – If more than 10% mortality occurs in the control organisms within 96 hours or more than 20% mortality occurs in the test organisms in 7 day period.

Corrective Action – The test is considered invalid and must be repeated using fresh control water and fresh sample.

13.2.7 Out of control 7-Day *Pimephales promelas* Larval Survival and Growth Test.

Rejection Criteria – The average weight of the control minnows is less than 0.2500 mg.

Corrective Action – The test is considered invalid and must be repeated using fresh control water and fresh sample.

13.2.8 Out of control Monthly Reference Toxicant:

Rejection Criteria – KCl is the reference toxicant used for acute and chronic testing for the following methods: 1000.0, 1002.0, 2000.0, and 2002.0. If reference toxicant test results fail to meet ESC in-house established criteria (± 2 standard deviations from the mean & median).

Corrective Action – The test is deemed invalid and must be repeated twice. No test will be performed using organisms that fail to meet reference toxicant criteria.

13.2.9 Out of control PMSD 7-Day *Pimephales promelas* Larval Survival and Growth Test.

Rejection Criteria – The PMSD value is greater than the upper value of 30.

Corrective Action - The test may be deemed invalid and should be repeated.

13.2.10 Out of control PMSD 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test.

Rejection Criteria – The PMSD value is greater than the upper value of 47.

Corrective Action - The test may be deemed invalid and should be repeated.

13.2.11 Out of control %CV 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test and 7-Day *Pimephales promelas* Larval Survival and Growth Test.

Rejection Criteria – The %CV value is greater than the upper value of 40%.

Corrective Action - The test is deemed invalid and must be repeated.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #030230, *Standards Logger, SOP #030227, Data Review* and SOP #030201, *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 13.0 and *SOP #010104, Internal Audits*.

16.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix IX)	General – Replaced the term “client” with the term “customer” Section 7.1 – Added third bullet point about containers used for collection and holding time of Acute and Chronic tests Table 8.1 – Updated equipment list Table 8.2 – Revised ATC check for pH meter to quarterly Table 8.3A – Added pH=4 buffer Section 8.3 – Minor clarifications about maintenance of in-house cultures Section 8.4 – Revised ATC check for pH meter to quarterly and added language about purchasing a new light meter rather than recalibrating an old one. Section 11.2 – Changed algal species used for 3-Brood Ceriodaphnia dubia Survival and Reproduction Test from Selanastrum capricornutum to Raphidocelis subcapitata

1.0 SIGNATORY APPROVALS

Microbiology Laboratory
QUALITY ASSURANCE MANUAL

APPENDIX X TO THE ESC
QUALITY ASSURANCE MANUAL

for

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NOTE: The QAM has been approved by the following people.

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that analytical data generated from the Microbiology laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in non-conforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the customer with both routine and specialized services, field sampling guidance and materials and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Dr. Christabel Fernandes-Monteiro, with a Ph.D. in Applied Biology, is the Department Manager of Biology. She oversees supervision of laboratory operations in the Mold, Aquatic Toxicity, Microbiology, Protozoan and BOD laboratories. Her responsibilities include assurance of reliable data through monitoring of quality control, corroborating the analysis performed, protocol development, coordination with customers regarding sample analysis, scheduling of tests and overall production in all sections within the Biology Laboratory, including management of staff. In her absence, Shain Schmitt assumes her responsibilities in the Microbiology laboratory.

Shain Schmitt with a B.S. degree in Conservation Biology, is the Primary Analyst for the Microbiology laboratory. Mr. Schmitt is proficient in microbiological analytical methods and is responsible for sample analysis, review and approval of data associated with microbiological analyses. In his absence, Brandon Etheridge assumes his responsibilities.

5.2 TRAINING

The Primary Analyst or Manager trains new laboratory analysts according to ESC protocol. ESC's training program is outlined in SOP #350355, *Technical Training and Personnel Qualification for Biomonitoring-Microbiology.* Performance is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in microbiological analysis is also demonstrated by acceptable participation in the Phenova proficiency testing program (PTs) and routine laboratory quality control practices. Documentation of analyst training is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the laboratory has approximately 1440 square feet of area with roughly 280 square feet of bench area. There are 300 square feet of additional storage and the lighting is fluorescence. The air system is a five-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the Siemans Elga Lab Pure deionizer system. Biohazard containers are located in the laboratory and Stericycle Waste Removal serves as ESC's biological waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- The following Biosafety Level 2 (BSL2) guidelines are adhered to:
  - Closed-toe shoes are worn in the laboratory
  - Floors and work surfaces are cleaned on a regular basis
  - Emergency numbers are posted in the laboratory
  - Laboratory personnel are trained in the use of the biological spill kit and emergency safety equipment
- ESC's laboratory safety guidelines are detailed in the ESC *Chemical Hygiene Plan*.

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedures are described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Samples for bacterial analysis are collected directly into pre-sterilized high-density polyethylene (HDPE) sample containers preserved with sodium thiosulfate. The container should be kept closed until sample collection. Once the container is open, do not wash, rinse or contaminate the cap or the inside of the container. For microbiological samples, the container is filled allowing at least 1 inch of headspace per container.
- Sources for microbiological samples are surface waters, waste and drinking water, ground water and soil/sludge.
- Holding times for microbiological drinking water samples is generally 30 hours (except HPC which has a 8 hour holding time). Soil and sludge samples have a holding time of 24 hour and 8 hours depending on the method used. All other water samples have a 8-hour hold time.

- Microbiological samples are shipped in a cooler lined with a heavy-duty plastic bag. Once the sample container lids are secure, the samples are placed in appropriately sized polyethylene bags. The chain of custody is also placed in a plastic bag. The cooler liner is completely filled with ice and the plastic bag sealed tightly with a cable tie. The shipping label contains the name and address of the shipper and is affixed to the outside of the cooler.
- Samples are received in the laboratory login area and are tracked using LIMS (Laboratory Information Management System). A Chain of Custody Form accompanies all samples received by the lab. This is necessary to prove the traceability of the samples and to document the change in possession from sampling to delivery to receipt by the laboratory. Prior to analysis samples are checked for integrity. Sample handling, tracking and acceptance procedures are outlined in *SOP 060105, Sample Receiving.*

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

TABLE 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Microbiological Analysis
This table is subject to revision without notice

Item	*Manufacturer*	*Model*	*Location*
Analytical Balance	Mettler	AT261 Delta Range	Microbiology Lab
Class "I" weights	(2 sets) Troemner		Microbiology Lab
Conductivity Meter	Orion	150 A+	Microbiology Lab
Autoclave	Pelton and Crane	Validator 8	Microbiology Lab
Water Bath	Lindberg Blue	WB1130A	Microbiology Lab
Water Bath	Blue M	MW-1110A-1	Microbiology Lab
Oven	Fisher	655F	Microbiology Lab
Incubator	VWR	2030 22MFG	Microbiology Lab
Quantitray Sealer	IDEXX	2X	Microbiology Lab
Incubator	Precision Sci.	818	Microbiology Lab
Colony Counter	Quebecor		Microbiology Lab
pH Meter	Beckman	pH/Temp/mV/ISE	Microbiology Lab
Refrigerator			Microbiology Lab
Stereoscope (2)	Olympus	SZH-ILLD	Microbiology Lab
UV light; short and long wave	UVP		Microbiology Lab
Autoclave	SterileMax	Harvey	Microbiology Lab
Stereoscope	Olympus	SZX-ILLK100	Microbiology Lab
Water Purifier	Siemans	Elga Lab Pure S4	Microbiology Lab
Oven	VWR	13054	Microbiology Lab
pH meter/Conductivity meter	Thermo Scientific Orion	VStar 52	Aquatic Tox Lab

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

PREVENTATIVE MAINTENANCE FOR LABORATORY EQUIPMENT		
INSTRUMENT	***P. M. DESCRIPTION***	***FREQUENCY***
Analytical Balances	•Check with Class "I" weights	Daily-tolerance 1 gm - ±0.0001 gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	10 gm - ±0.01 gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semi-annually
Refrigerators, Incubators, and Water Baths	•Maintenance service	Determined by twice daily temperature performance checks @ least 4 hours apart, when in use.
Water Bath	•Check thermometer vs. NIST traceable	Annually
Water Bath	•Remove from service when not maintaining temperature and send off for repair or replace	As needed
Autoclave	•Check sterilization efficiency	Monthly – Geobacillus stearothermophilus ampoule
Autoclave	•Check sterilization efficiency	With each use– Chemical Indicator Strip
Conductivity Meter	•Calibrate and clean probe	As needed
Conductivity Meter	•Replace or replatinize probe	When poor response not corrected by above
pH	Automatic Temperature Compensation of pH probe	Quarterly
Stereoscope	• Clean optics and stage	Each Use
pH Meters	•Reference junction & electrode replacement	As needed
pH Meters	•Probe stored in pH 4.0 Buffer	At all times when not in use.
pH Meters	•Other	As described in the manufacturer's O & M manual
Autoclave	•Check timing device	Quarterly
pH meter	•Calibrate and check slope (per manufacturer)	Daily
Quanti-Tray Sealer	•Check sealer for leaks	Monthly
Water Purifier	•Conductivity check using a calibrated conductivity meter	Monthly
Water Purifier	•Check for TOCs, ammonia, nitrogen, TRC and heterotrophic bacteria	Monthly
Water Purifier	•Check for single and heavy total metals	Annually
Incubators and Water Baths	Perform temperature stability and load testing	Annually
Autoclave	•Check pressure (annual contract maintenance)	Annually
Autoclave	Check mechanical timing device	Quarterly
Stereoscope	• Clean optics and stage; microscope alignment (annual maintenance contract)	Annually

8.3 STANDARDS AND REAGENTS

All reagents and standards must meet the requirements listed in the analytical methods.

Table 8.3A: Commercially prepared agar/broth, reagent sources, and storage information. ***(subject to revision as needed)***

Agar Type	*Source*	*Storage*
M-FC Broth w/ Rosolic acid	Millipore	4 ± 2°C
A-1 Media (broth)	Hach	4 ± 2°C
mEndo Broth	Hach	4 ± 2°C
Lauryl Tryptose Broth	Hach	4 ± 2°C
Brilliant Green Lactose Broth	Hach	4 ± 2°C
EC media w/ mug broth	Hach	4 ± 2°C
HPC	Hach	4 ± 2°C
Colilert reagent powder	IDEXX	Room temp
Enterolert reagent powder	IDEXX	Room temp
Phosphate Buffer Solution	Weber Scientific	Room temp

All stock agar expirations are per manufacturer specification.

Table 8.3B: In-house prepared agar/broth, reagent sources, and storage information.
(subject to revision as needed)

Agar Type-Stock	*Source*	*Stock Storage*	*Stock Expiration*	*Preparation Components Media*	*Prepared Storage*	*Prepared Expiration*
Plate Count Agar	VWRDifco	Room Temp	As specified by Manufacturer	PCA + Water	4 ± 2°C	3 months
Tryptic Soy Agar	VWRDifco	Room Temp	As specified by Manufacturer	TSA + Water	4 ± 2°C	3 months
Tryptic Soy Broth (TSB)	VWRDifco	Room Temp	As specified by Manufacturer	TSB + Water	4 ± 2°C	3 months
Lauryl Tryptose Broth (LTB)	VWRDifco	Room Temp	As specified by Manufacturer	LTB + Water	4 ± 2°C	3 months
Buffered Rinse Water	VWRDifco	4 ± 2°C	As specified by Manufacturer	KH_2PO_4 + $MgCl_2$+Water	Room temp.	1 year
Heart Infusion Agar	VWR/BD	Room Temp	As specified by Manufacturer	HIA + Water	4 ± 2°C	2 weeks

Membrane Filters and Pads

Membrane filters and pads are purchased and certified to meet the following specifications:

- Filter diameter - 47 mm, mean pore diameter - 0.45 μm. Alternate filter and pore sizes may be used if the manufacturer provides data verifying performance equal to or better than that of 47mm-diam, 0.45-μm-pore size filter. At least 70% of filter area must be pores.
- When filters are floated on reagent water, the water diffuses uniformly through the filters in 15s with no dry spots on the filters.
- Flow rates are at least 55 mL/min/cm^2 at 25°C and a differential pressure of 93kPa.
- Filters are nontoxic, free of bacterial-growth-inhibiting or stimulating substances, and free of materials that directly or indirectly interfere with bacterial indicator systems in the media. Ink grid is nontoxic. The arithmetic mean of five counts on filters must be at least 90% of the arithmetic mean of the counts on five agar spread plates using the same sample volumes and agar media.
- Filters retain the organisms from a 100mL suspension of *Serratia marcescens* containing 1×10^3 cells.
- Water extractables in filters do not exceed 2.5% after the membrane is boiled in 100mL reagent water for 20min, dried, cooled, and brought to constant weight.
- Absorbent pad has diameter 47mm, thickness 0.8mm, and is capable of absorbing 2.0 ± 0.2mL Endo broth.
- Pads release less than 1mg total acidity calculated as $CaCO_3$ when titrated to the phenolphthalein endpoint with 0.02*N* NaOH.
- If the filter and absorbent pad are not sterile, they should not be degraded by sterilization at 121°C for 10min. Confirm sterility by absence of growth when a membrane filter is placed on a pad saturated with tryptic soy broth and incubated at 35 ± 0.5°C for 24h.

8.4 INSTRUMENT CALIBRATION

Autoclave

Prior to first use, autoclaves must be initially evaluated for performance. All initial checks must be recorded and records must be retained on file. With each use, a record of items sterilized, temperature, pressure, and time is kept for each batch processed. Operating temperature is checked and recorded at least weekly with a minimum/maximum thermometer. Performance is tested monthly with *Bacillus stearothermophilus* ampoules. Chemical strips are used with each use to verify that supplies and materials in each cycle have been sterilized. The autoclave mechanical timing device is checked quarterly against a stop watch and actual time elapsed documented. Records of autoclave operations are maintained for every cycle. Records include: date, contents, maximum temperature reached, pressure, time in sterilization mode, total run time (may be recorded as time in and time out) and analyst's initials.

Quebecor Colony counter

A dark field colony counter is used to count Heterotrophic Plate Count colonies. Maintenance is performed per manufacturer's instructions.

Quanti-tray Sealer

The Quanti-tray sealer is checked monthly using 100mL of bromocresol purple, or equivalent dye. The solution is poured into a test tray, sealed, and tested for leaks.

pH Meter/Conductivity Meter

With each use, calibrate the instrument according to the manufacturer's instructions. Verify that the slope of the calibration is within the manufacturer's acceptable range prior to use. Automatic temperature compensation (ATC) verifications are performed quarterly on the pH probe.

Incubators & Waterbaths

Records of temperature checks are documented twice daily at least 4 hours apart when in use. Thermometers used for temperature checks are verified at least annually. Temperature stability and load testing is performed on an annual basis.

Analytical Balances

Analytical balances are checked at least daily prior to each use with class "I" weights. Records of these verifications are maintained within the laboratory. Balances are also serviced and verified and/or calibrated by an external calibration service at least semi-annually.

Volumetric Equipment, IDEXX and Commercially Prepared Phosphate Buffer Bottles

Equipment such as filter funnels, bottles, pipettes, non-Class A glassware and other containers with graduation must be calibrated once per lot prior to the first use. Mechanical hand pipettes, automatic dispensers and diluters are verified for accuracy quarterly. The error of calibration must not exceed 3%.

IDEXX Bottles and Quanti-trays

Prior to first use, IDEXX bottles and Quanti-trays must be checked for fluorescence using a long wave UV light.

Ultraviolet Lamp

The output of the UV lamp used to measure fluorescence for the identification of *E. coli* is tested quarterly with a UV light meter. The UV bulbs are replaced if the output is less than 70% of the original.

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent Grade water –Type II used in the Microbiology Laboratory is periodically checked for contamination. Type II water is checked annually for single and total heavy metals and organic chemicals. Monthly checks for total organic carbon, ammonia and organic nitrogen, total residual chlorine and a heterotrophic plate count are also conducted. Resistivity and pH are checked continuously or with each use. Conductivity is also checked monthly using a calibrated conductivity meter. The Use test is performed quarterly and the Water Suitability test is performed annually.

9.2 GLASSWARE WASHING , STERILIZATION PROCEDURES AND EQUIPMENT STERILITY CHECKS

Glassware washing and preparation/sterilization procedures are performed according to EPA guidelines and are outlined in *SOP 030701 Glassware Cleaning and SOP 350335, Quality Control and Quality Assurance of Microbiological Equipment and Testing Materials.* Before use, examine and discard items with chipped edges or etched inner surfaces. Reusable glassware is cleaned using the protocol established by the EPA:

- Soak for 15 minutes in hot tap water with detergent and scrub. Rinse thoroughly with tap water. Rinse thoroughly with dilute nitric acid (10%). Rinse thoroughly with deionized water. Rinse thoroughly with pesticide grade acetone. Rinse well with deionized water.
- New glassware are cleaned according to the same procedure as listed above except the first step is preceded by soaking overnight in 10 % HNO_3.

Inspect glassware after washing for excessive water beading and rewash, if necessary. Perform checks on pH and test for inhibitory residues on glassware and plastic ware. Use utensils and containers of borosilicate glass, stainless steel, aluminum, or other corrosion resistant material for media preparation. All biological glassware is purchased pre-sterilized. In-house sterilization of any auxiliary equipment is performed via autoclave.

Pipettes of all sizes are checked for sterility by drawing up non-selective media into the pipette and re-dispensing the volume back into original tube that contained the media. The tube is then incubated and monitored for growth. All results are recorded and maintained within the laboratory.

Inoculating loops are cultured by aseptically transferring the entire tip of the loop into a tube containing non-selective media. The tube is incubated and monitored for growth. Results are maintained within the laboratory.

A sterility check is performed on one container for each lot of purchased, pre-sterilized sample containers, and IDEXX containers. Results are maintained within the laboratory.

A check is performed on one container from each new lot of microbiological sample containers to ensure efficacy of sodium thiosulfate to 15 mg/L chlorine, and documented. A sterility check is performed on each batch of dilution and rinse water prepared in the laboratory and on each batch of commercially prepared water with non-selective growth media prior to first use.

In addition, stock solutions used for preparing rinse water are checked for turbidity prior to each use. If turbid, the stock buffer is discarded or re-sterilized.

9.3 MEDIA STERILITY VERIFICATION PROCEDURES

A sterility check must be analyzed for each lot of pre-prepared media and for each lot of media prepared in the laboratory. This is done prior to the first use of the media used for membrane filtration, MPN, pour plate and chromofluorogenic methods. For media used in the pour plate analytical technique, sterility blanks of the media must be made by pouring an uninoculated plate for each run in addition to sterility and lot comparison tests being performed on each lot prior to first use. Reagents and containers used in chromofluorogenic method tests are checked for fluorescence prior to first use.
All results of the sterility and lot comparison tests are documented.

9.4 POSITIVE AND NEGATIVE CONTROLS USING PURE CULTURES

ATCC Pure Cultures

Positive culture controls demonstrate that the media can support the growth of the target organism(s), and that the media produces the specified or expected reaction to the target organism(s). All media must be tested with at least one pure culture of a known positive reaction. This must be done prior to first use of the media.

Negative culture controls demonstrate that the media does not support the growth of non-target organisms or does not demonstrate the typical positive reaction of the target organism(s). All batches of selective media in the laboratory must be analyzed with one or more known negative culture controls. This must be done prior to first use of the media.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the microbiology laboratory can be found in the following table:

TABLE 10.1: MICROBIOLOGICAL DEPARTMENT SOPs
This Table is subject to revision without notice

SOP #	Title/Description
350305	Fecal Coliform: Membrane Filter Technique (SM 9222D)
350315	Fecal Coliform Determination in Biosolids: Membrane Filter Technique (SM 9222D)
350315A	Fecal Coliforms in Sewage Sludge (Biosolids) by MPN Fermentation using A-1 medium (EPA Method 1681)
350316	Total Coliform (SM 9222B)
350321	Pocket Colorimeter Chlorine Tester Maintenance and Calibration
350325	PH Meter Maintenance and Calibration
350326	Thermometer Operation, Maintenance and Calibration Procedure
350328	Conductivity Meter Maintenance and Calibration
350332	Laboratory Maintenance of Bacteria Reference Cultures
350333	QA/QC of Microbiological Equipment and Testing Materials
350343	Colilert (SM 9223B)
350348	Enterolert (ASTM 6503-99)
350354	HPC (SM 9215 B)
350355	Technical Training and Personnel Qualification for Biomonitoring-Microbiology
350356	Water bath and Incubator Temperature Stability and Load Testing
350359	Calibration and Maintenance of Autoclaves
350369	Sterilization, Sanitization and Residue Testing of Microbiological Glassware and Equipment
350380	Class “A” MPN Fecal Coliform Analysis (SM 9221E/C)

10.2 Additional information regarding microbiological testing can be found in:

- Standard Methods for the Examination of Water and Wastewater, Sections 9020 through 9050.
- Heterotrophic Plate Count, SM 9215B
- Fecal Coliform Direct Test (A-1 Media), SM 9221E
- Standard Total Coliform Membrane Filter Procedure, SM 9222B.
- Fecal Coliform Membrane Filter Procedure, SM 9222D.
- Enzyme Substrate Test, SM 9223B.
- Environmental Regulations and Technology, Control of Pathogens and Vector Attraction in Sewage Sludge, Appendix F.
- Fecal Coliforms in Sewage Sludge, EPA 821-R-06-013

11.0 QUALITY CONTROL CHECKS

11.1 ESC participates in microbiological proficiency testing (PTs) in various matrices by analyzing samples provided by Phenova. Blind samples are received and analyzed according to instructions from Phenova and the standard operating procedure.

11.2 Plate count comparison between two analysts is conducted monthly. Acceptable plate count comparisons must be within 10%. Analyst deviations that are outside the 10% range are repeated. If the repeat inter-analyst count is unacceptable, additional procedural training and method reviews are conducted.

11.3 Duplicate analyses are performed on 10% of samples or at least one sample per month for total and fecal coliform and *E. coli* tests. Due to the infrequent laboratory receipt of some samples, duplicate analyses are conducted per sample. If the RPD exceeds 20%, the data is qualified.

11.4 For membrane filtration analyses, sterility control checks are conducted on the filter assembly at the beginning and end of each sequence and following every 10 samples analyzed. If QC blanks fails, the run is rejected or qualified.

11.5 Verification of total coliform and fecal coliform colonies must be conducted monthly (10 colonies/month for wastewater). Colonies found in drinking water samples must have at least five typical sheen colonies and five atypical colonies verified.

11.6 For HPC analysis, duplicate plates are run for each dilution. A positive control and an uninoculated plate performed for each run. If the QC fails, the run is rejected and qualified, and sample re-collected.

11.7 Duplicate counts are performed monthly for colony counts from membrane filtration or pour plated media on one positive sample for each month the test is performed. Each analyst counts typical colonies on the same plate and counts must be within 10% difference to be acceptable, if the laboratory has two or more analysts. The same plate is counted twice by the analyst and difference between counts must be no more than 5% in laboratories with only one analyst.

11.8 For biosolids testing, an Initial Precision and Recovery test (IPR) is performed prior to the first time the method is used and at any time the method or instrumentation is modified. The IPR consists of four Milorganite® samples spiked with *E. coli* (ATCC #25922), and must be accompanied by an acceptable method blank and appropriate sterility checks. Mean percent recoveries from the IPR must fall within the EPA approved QC limits of 1-312%, and Relative Standard Deviation of the recovery should be less than or equal to 96%.

11.9 For biosolids testing, an Ongoing Precision and Recovery sample (OPR) is analyzed after every 20 field and matrix spike samples, or one per week that samples are analyzed, whichever occurs more frequently. The OPR consists of one Milorganite® sample spiked with *E. coli* (ATCC #25922), and must be accompanied by an acceptable method blank and appropriate sterility checks. Recoveries from the OPR must fall within the EPA approved QC limits of 1- 371%.

11.10 For biosolids testing, a Method blank is analyzed everyday samples are processed. The Method Blank must be free of contamination from the target organism, and serve as a sterility control to verify the sterility of equipment, materials, and supplies.

11.11 For biosolids testing, a Matrix Spike (MS) is analyzed when samples are first received from a source from which the laboratory has not previously analyzed samples and

subsequently, 5% of field samples to determine the effect of a particular matrix on fecal coliform recoveries. MS samples must be accompanied by the analysis of an unspiked field sample sequentially collected from the same sampling site, an acceptable method blank, media sterility checks, and an OPR sample if possible. MS percent recoveries must fall within the EPA approved QC limits: Class A Biosolid= 2-541%; Class B Biosolid= >0-6172%, and RSD less than or equal to 182% and 184% for Class A and Class B biosolids, respectively.

11.12 For biosolids testing, control charts for OPR, IPR, and MS are charted and maintained in the laboratory. The control charts graphically display the results of continuing performance when using Method 1681.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in *SOP 030201 Data Handling and Reporting.* The primary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP has been followed
- Sample preparation is correct and complete
- Analytical results are correct and complete
- QC is within criteria and complete

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by reviewing all data entries and calculations for errors, reviewing all documentation to assure that sample information is correct, and that the tests have been performed appropriately and within the appropriate holding times. The secondary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP has been followed
- Sample preparation is correct and complete
- Analytical results are correct and complete

12.3 REPORTING

Reporting procedures are documented in *SOP 030201 Data Handling and Reporting.* Microbiological data is reported as Colony Forming Units (CFU) per unit volume, Presence/Absence, or Most Probable Number (MPN)/100mL.

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CARs are kept on file by the Regulatory Affairs Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

All samples and procedures are governed by ESC's quality assurance program. Designated corrective actions are as follows:

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria takes precedence.

13.2.2 Out of control plate count comparisons between analysts.

Rejection Criteria – Comparisons must be within ±10% for monthly plate count comparisons.

Corrective Action – Duplicate counts are repeated. If repeat counts are still beyond acceptance range, procedural training and method reviews are conducted.

13.2.3 Out of control duplicate analyses for total and/or fecal coliform or *E. coli*.

Rejection Criteria – Duplicate RPDs must not exceed 20% for total and/or fecal coliform or *E. coli.*

Corrective Action – Data is qualified or the analysis is repeated. If repeat analysis is still beyond acceptance range, procedural training and method reviews are conducted.

13.2.4 Out of control QC blank for membrane filtration analysis.

Rejection Criteria – Blank analyses performed either at the beginning or end of the analytical sequence is positive.

Corrective Action – The analytical sequence may be rejected and reprocessed or qualified based on the nature of the contamination.

13.2.5 Out of Control QC Blank for HPC analysis

Rejection Criteria - Blank analysis performed during each run is positive for growth.

Corrective Action - The analytical run is rejected, and data qualified with an “R” for rejected data, and sample re-collected.

13.2.6 Out of control IPR analyses

Rejection Criteria - Recoveries from IPR fall outside of the required range for recovery: 1 - 312%, and RSD of 96%.

Corrective Action - Identify the problem by evaluating each step in the analytical process, media, reagents, and controls, correct the problem and repeat the IPR.

13.2.7 Out of Control OPR analyses

Rejection Criteria - Recoveries from OPR fall outside of the required range for recoveries: 1-371%.

Corrective Action - Identify the problem by evaluating each step in the analytical process, media, reagents, and controls, correct the problem and repeat the OPR.

13.3.8 Out of Control MS analyses

Rejection Criteria - Recoveries from MS fall outside of the required range for recoveries: Class A Biosolid= 2-541%; Class B Biosolid= >0-6172%, and RSD less than or equal to 182% and 184% for Class A and Class B biosolids, respectively.

Corrective Action - Flag all associated filed data.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #030230, *Standards Logger, SOP #030227, Data Review* and SOP #030201, *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 13.0 and *SOP #010104, Internal Audits*.

16.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix X)	General – Replaced the term “client” with the term “customer” Table 8.1 – Updated Equipment List Table 8.2 – Revised ATC check for pH meter to quarterly Section 8.4 – Revised ATC check for pH meter to quarterly Table 10.1 – Updated SOP List

1.0 SIGNATORY APPROVALS

Mold/BOD Laboratory
QUALITY ASSURANCE MANUAL

APPENDIX XI TO THE ESC QUALITY ASSURANCE MANUAL

for

ESC LAB SCIENCES
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Prepared by

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NOTE: The QAM has been approved by the following people.

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2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This appendix discusses specific QA requirements for general analytical protocols to ensure that analytical data generated from the Mold laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the customer with both routine and specialized services, field sampling guidance and materials and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in Section 4.0 in the *ESC Quality Assurance Manual.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Dr. Christabel Fernandes-Monteiro, with a Ph.D. in Applied Biology, is the Department Manager for Biology. She oversees supervision of laboratory operations in the Mold, Aquatic Toxicity, Microbiology, BOD and Protozoan laboratories. Her responsibilities include assurance of reliable data through monitoring of quality control, corroborating the analysis performed, protocol development, coordination with customers regarding sample analysis, scheduling of tests and overall production in all sections within the Biology Laboratory, including management of staff. Dr. Fernandes-Monteiro oversees the review and approval processes of all data associated with all Biological laboratory sections. She gained experience in Mold analytical techniques at ESC, an AIHA-LAP accredited laboratory, and obtained additional training in microscopic techniques at the McCrone Research Institute. She also reviews AIHA-LAP and EPA online training modules related to the methods being performed in the Mold and BOD Laboratory. In her absence, Bridget Miller assumes responsibility for Mold/BOD departmental decisions.

Bridget Miller, with a BS degree in Biology, is the Primary Analyst in the Mold and BOD laboratory. She is proficient in Mold analytical methods as per AIHA-LAP guidelines. Bridget has gained analytical experience at ESC, an AIHA-LAP accredited laboratory, and obtained additional training in Mold analysis at the McCrone Research Institute. She reviews AIHA-LAP and EPA online training modules related to the methods being performed in the Mold and BOD Laboratory.

5.2 TRAINING

All new analysts to the laboratory are trained by the Primary Analyst or Manager according to ESC protocol. ESC's training program is outlined in SOP #350355, *Technical Training and Personnel Qualification for Biomonitoring-Mold.* Analyst performance in the Mold/BOD Laboratory is documented using an initial demonstration of capability (IDOCs) and continuing demonstration of capability (CDOC). On-going acceptable capability in mold analysis is demonstrated by acceptable participation in the AIHA-PAT proficiency testing programs (EMPAT-Direct Exam and EMPAT-Bacterial/Fungal), Round Robin analysis and daily Quality Control sample analysis. On-going acceptable capability in BOD analysis is demonstrated by acceptable participation in the Phenova proficiency testing program and daily Quality Control sample analyses. Documentation of analyst training, including a copy of college transcripts or degree, is maintained on file within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

MOLD LAB

The main area of the Mold laboratory has approximately 532 square feet with 167 square feet of bench space. The lighting throughout the laboratory is fluorescence. The air system is a five-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the ELGA PureLab Ultra deionizer system. Biohazard containers are located in the laboratory and Stericycle Waste Removal serves as ESC'S biological waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

BOD LAB

The main area of the BOD laboratory has approximately 532 square feet of area with 151 square feet of bench space. The lighting standard throughout the laboratory is fluorescence. The air system is a five-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the ELGA PureLab Ultra deionizer system. Biohazard containers are located in the laboratory and Stericycle Waste Removal serves as ESC'S biological waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where infectious aerosols or splashes may occur are conducted in biological safety II cabinets.
- The following Biosafety Level 2 (BSL2) guidelines are adhered to:
  - Closed-toe shoes are worn in the laboratory
  - Floors and work surfaces are cleaned on a regular basis
  - Emergency numbers are posted in the laboratory

- Biological safety hoods are tested and certified annually
- Laboratory personnel are trained in the use of the biological spill kit and emergency safety equipment

- ESC's laboratory safety guidelines are detailed in the ESC *Chemical Hygiene Plan*.

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- Field Sampling procedure is described in Appendix III of this ESC Quality Assurance Manual. Sample information is recorded and kept on the ESC chain of custody and field logbooks.
- Samples are received in the laboratory login area and are tracked using LIMS (Laboratory Information Management System). A Chain of Custody Form accompanies all samples received by the lab. This is necessary to prove the traceability of the samples and to document the change in possession from sampling to delivery to receipt by the laboratory. Prior to analysis samples are checked for integrity. Sample handling, tracking and acceptance procedures are outlined in SOP #060105*, Sample Receiving.*
- Sample storage procedures are followed using guidance from each approved method and associated department SOP.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

TABLE 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Mold/ BOD Analysis
This table is subject to revision without notice

Item	Manufacturer	*Model*	*Serial #*	*Location*
Analytical Balance	Mettler	PL602-S	1125081657	Bacteriology Lab
Autoclave	Tuttnauer	2540EK	2906170	Bacteriology Lab
Class I BSC	AirFiltronix	AirFiltronix HS 4500	41031	Mold Lab
Class II BSC	Labconco	Labconco 36213	60554894	Mold Lab
Class II BSC	Labconco	Labconco 36209	03076555	Bacteriology Lab
COD Reactor	HACH	45600	900903221	BOD
Microscope	NIKON	LABOPHOT	242008	Mold Lab
Microscope	NIKON	LABOPHOT	235267	Mold Lab
Microscope	Olympus	CH2	900216	Mold Lab
Microscope	Olympus	BH-2	708821	Mold Lab
Microscope	Leitz	Laborlux	512663	Mold Lab
Microscope	VWR Scientific	VWRC1	V167173	Mold Lab
Refrigerator	Whirlpool			Bacteriology Lab
Refrigerator	Whirlpool	El05PPXMQ	EEP3524864	Mold Lab
Refrigerator	Whirlpool	EL7ATRRMQ07	EWR4973976	Mold Lab

TABLE 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Mold/ BOD Analysis
This table is subject to revision without notice

Item	Manufacturer	*Model*	*Serial #*	*Location*
Refrigerator	Frigidaire	FRT17G4BW9	BA703306	Mold Lab
Stereoscope	VWR Scientific	VWRS1	V168430	Mold Lab
Incubator	Labtronix	BOD2100D	21000010213	Mold Lab
Incubator	Quincy Lab	10-100	I11-2454	Mold Lab
Incubator	Precision Scientific	30M	9303590	Bacteriology Lab
Incubator	Precision Scientific	30M		Bacteriology Lab
Incubator	VWR	2030	802202	BOD
Incubator	Fisher	Not Visible	100212	BOD
Incubator	Thermo Scientific Precision	3271	317217-1241	BOD
Incubator	Precision	818	35AK-10	BOD
Waterbath	Blue M-MagniWhirlpool	MW-1110A	14991	Bacteriology Lab
Waterbath	Precision	Circulating 260	21-AJ11	BOD
Biolog MicroStation	Biolog, Inc.	Microlog 3	342689	Bacteriology Lab
Turbidimeter	Biolog, Inc.	21907	6093898	Bacteriology Lab
Plate Reader	Biotek	ELX808BLG	203222	Bacteriology Lab
Vortex Genie2 Mixer	VWR	G-560	2-223236	Mold Lab
Vortex Genie2 Mixer	VWR	G-560	2-223236	Bacteriology Lab
Stir Plate	Corning	PC-420D	023507102961	Bacteriology Lab
Stir Plate	Fisher	118	102	Bacteriology Lab
Stir Plate	VWR	205	7852	BOD
Stir Plate	VWR	220	5031	BOD
BOD SP Robotic Analyzer	Skalar	SP50	08124	BOD
BOD SP Robotic Analyzer	Skalar	SP50	08123	BOD
DO meter	YSI	5000	081C101451	BOD
DO meter	YSI	5000	081C101450	BOD
pH meter	VWR	Symphony B10P	12284S0009	BOD
Spectrophotometer	Hach	DR 2700	1388224	BOD

8.2 EQUIPMENT PREVENTIVE MAINTENANCE

INSTRUMENT	*P. M. DESCRIPTION*	*FREQUENCY*
Analytical Balances	•Check with Class "I" weights	Daily-tolerance 1 gm - ±0.0001gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	10 gm - ±0.01 gm
Analytical Balances	•Service/Calibration (semiannual contract maintenance and calibration check)	Semiannually
Refrigerators, Waterbaths, & Incubators	•Maintenance service	As needed - determined by daily temperature performance checks twice daily and at least 4 hours apart
Water Bath	•Check thermometer vs. NIST	Annually

INSTRUMENT	*P. M. DESCRIPTION*	*FREQUENCY*
Water Bath	•Remove from service when not maintaining temperature and send off for repair or replace	As needed
Incubators and Waterbaths	Perform Temperature stability and load testing	Annually
Autoclave	•Check sterilization efficiency	Weekly – *G. stearothermophilus*
Autoclave	•Check sterilization efficiency	Per Use – Chemical Indicator
Autoclave	Check timing devices	Quarterly
Autoclave	Check pressure (annual Maintenance contract)	Annually
Class II Biosafety Cabinet	•Monitor air and UV lamps	Monthly
Class II Biosafety Cabinet	•Inspect for air flow	Quarterly
Class II Biosafety Cabinet	•Recertification according to NSF standard 49	Annually
Turbidimeter	•Maintenance Service	Annually
Turbidimeter	•Check for accuracy using NIST traceable stds	Per Use
Biolog MicroStation	•Maintenance Service	Annually
Microscope	•Service/calibration of each ocular micrometer	Annually
Microscope	•Clean optics and stage, Kohler Alignment	Each Use
pH meters	Calibrate and check slope (acceptablerange)95-	Daily
pH meters	Reference junction & electrode replacement	As needed
pH meters	Probe stored in KCl	At all times when not in use
pH meters	ATC checks	Quarterly
pH meters	Other	As described in manufacturer's O &
BOD SP Robotic Analyzer	Calibrate DO probe	Daily
BOD SP Robotic Analyzer	Clean and Change DO probe membrane	Weekly
BOD SP Robotic Analyzer	Rinse ATU (seed) dispenser using rinse pump option	As needed
BOD SP Robotic Analyzer	Clean rinsing vessel	Every three months or as needed
BOD SP Robotic Analyzer	Replace tubing for dispenser, diluent pump, and rinsing vessel	Annually or as needed

.

8.3 STANDARDS AND REAGENTS

Table 8.3A lists commercially prepared agar sources. Table 8.3 B lists in-house prepared agar sources and storage information. Table 8.3C lists standard sources, receipt, and preparation information for BOD Analysis. Table 8.3D is designed to provide general calibration range information for BOD analysis. These tables may change depending on regulatory requirements, procedural changes, or project needs.

Table 8.3A: Commercially prepared agar sources and storage information.
(subject to revision as needed)

Agar Type	*Source*	*Storage*
Malt Extract Agar w/chloramphenicol (MEA)	HealthLink	4 ± 2°C
DG18 Agar	HealthLink	4 ± 2°C
Modified Cellulose Agar	HealthLink	4 ± 2°C
Tryptic Soy Agar w/Sheep Blood	HealthLink	4 ± 2°C
2 % Malt Extract	Biolog	4 ± 2°C
BUG w/BL	Biolog	4 ± 2°C
BUA w/BL	Biolog	4 ± 2°C

Table 8.3A: Commercially prepared agar sources and storage information. *(subject to revision as needed)*		
Agar Type	***Source***	***Storage***
Biolog Universal Yeast Agar (BUY)	Biolog	4 ± 2°C
TSA w/SB contact	HealthLink	4 ± 2°C
Malt Extract Agar w/chloramphenicol contact	HealthLink	4 ± 2°C
Chocolate Agar	Biolog	4 ± 2°C
Czapek Yeast Extract Agar	HealthLink	4 ± 2°C
CNA w/5 % SB	HealthLink	4 ± 2°C
Saboraud's Dextrose Agar	HealthLink	4 ± 2°C

All stock agar expirations are per manufacturer specification.

Table 8.3B: In-house prepared agar sources and storage information. *(subject to revision as needed)*						
Agar Type-Stock	***Source***	***Stock Storage***	***Stock Expiration***	***Preparation Components Media***	***Prepared Storage***	***Prepared Expiration***
Malt Extract Agar (MEA) slants	VWR/Difco	Room Temp	As specified by Manufacturer	MEA + Water	4 ± 2°C	3 months
Anaerobic Agar (ANA)	VWR	Room Temp	As specified by Manufacturer	ANA + water	4 ± 2°C	2 weeks
Tryptic Soy Agar (TSA) slants	VWR/Difco	Room Temp	As specified by Manufacturer	TSA + Water	4 ± 2°C	3 months
Tryptic Soy Broth (TSB)	VWR/Difco	Room Temp	As specified by Manufacturer	TSB + Water	4 ± 2°C	3 months

Table 8.3C: Standard sources, description and calibration information. *(This table is subject to revision without notice)*						
Instrument Group	***Standard Source***	***How Received***	***Source/Storage***	***Preparation from Source***	***Lab Stock Storage***	***Preparation Frequency***
BOD	Lab preparation	As dry glucose and glutamic acid	Dessicator	150mg each/L	Ambient	Made fresh daily
pH meter	Commercial source	pH 4.0 buffer	Ambient	No prep required	NA	Annual/Expiration Date
pH meter	Commercial source	pH 7.0 buffer	Ambient	No prep required	NA	Annual/Expiration Date
pH meter	Commercial source	pH 10.0 buffer	Ambient	No prep required	NA	Annual/Expiration Date
Turbidity meter	Commercial source	Turbidity standard	Ambient	No prep required	NA	Annual/Expiration Date

Table 8.3D: Working Standard Calibration	
Analysis	***Calibration Standard***
BOD	D.O.- Barometric pressure/temp, Glucose and glutamic acid reference standard

Source of Fungi

A collection of fungi is maintained in the laboratory as training and reference material. The fungi are isolated from proficiency testing samples, laboratory contaminants and customer samples, and stored as Malt Extract Agar slants for 3 months at 4 ± 2ºC. Cultures are sub-cultured every 3 months. Each culture is assigned an accession number, genus, specific epithet, authority, source, and name of collector. Records are maintained in the laboratory in the accession list database.

Source of Bacteria

A collection of bacteria is maintained in the laboratory as training and reference material. The bacterial strains are purchased from an accredited microbiological supply company and are used as positive and negative reference controls. Alternatively, bacterial strains are collected from proficiency testing samples and laboratory contaminants, and stored as Tryptic Soy Agar slants for 3 months at 4 ± 2ºC.

8.4 INSTRUMENT CALIBRATION

Autoclave

Operating temperature is checked and recorded with each use with a minimum/maximum thermometer. Performance is tested weekly with *Bacillus stearothermophilus* ampoules. Chemical strips are used with each batch processed to verify that supplies and materials have been sterilized. Records of autoclave operations are maintained for every cycle. Records include: date, contents, maximum temperature reached, pressure, time in sterilization mode, total run time (may be recorded as time in and time out) and analyst initials.

Incubators & Waterbaths

The record of temperature checks is documented twice daily at least 4 hours apart when in use. Thermometers used for temperature checks are verified at least annually. In addition temperature chart recorders are being used to continuously monitor the temperature in the incubators used for BOD analysis and the BOD Lab.

Analytical Balances

Analytical balances are checked at least daily prior to each use with class “I weights. Records of these verifications are maintained within the laboratory. Balances are also serviced and verified and/or calibrated by an external calibration service at least semi-annually.

Microscope

A record of cleaning and alignment for each microscope is maintained in the laboratory. Each microscope has an ocular micrometer that is verified annually with a stage micrometer. All microscopes are serviced annually by an external microscope service.

Biochemical Oxygen Demand Robotic Analyzer – SOP Number 340303A

The Dissolved oxygen meter is calibrated according to manufacturer's instructions with each use. Air calibration is performed on the DO meter probes to correct DO for the ambient temperature and given local barometric pressure. The local barometric pressure is determined from information provided by the National Weather Service for the Nashville International Airport (BNA) by accessing http://w1.weather.gov/obhistory/KBNA.html.The air calibration is confirmed daily using the Winkler Test. During the analytical sequence, the calibration stability of the DO probes is verified after every ten samples and at the end of sequence, by the analysis of continuing calibration verification (CCV). If either of the readings differs from the initial readings by more than 0.2 mg DO/L., the instrument automatically re-calibrates the DO meters and re-reads everything after the last passing CCVs.

A laboratory control sample (LCS) is prepared from glucose and glutamic acid, and is analyzed in triplicate exactly like a field sample at the beginning of the workgroup, after every twenty samples throughout the run and at the end of the workgroup, to verify that the analytical process is performing accurately.

pH meter

With each use of pH meters, calibrate the instrument according to manufacturer's instructions. The slope is documented on a daily basis. Acceptable pH slope range is per the manufacturer's operating manual. Automatic temperature compensation (ATC) verifications are performed quarterlyon the pH probe.

Turbidimeter

With each use, calibrate the instrument according to manufacturer's instructions. Adjust transmittance to a 100% using a blank reference test tube. Establish appropriate turbidity range on turbidimeter by adding or subtracting 2% T to the percent transmittance measured with the appropriate turbidity standard.

Volumetric equipment

Equipment such as pipettes, non-Class A and other containers with graduations are calibrated once per lot prior to first use. Volumetric equipment that is not disposed of after use is calibrated on an annual basis. The error of calibration must not exceed 3%.

Air Sampler

The air sampling pump used for laboratory environmental monitoring is verified monthly prior to use with a calibrator that is calibrated annually by an ISO 17025 accredited laboratory to ensure its measurement integrity.

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

Reagent Grade water –Type II used in the Mold Laboratory is periodically checked for contamination. Type II water is checked annually for single and total heavy metals, and organic contaminants. Monthly checks for total organic carbon, ammonia and organic nitrogen, total residual chlorine and a heterotrophic plate count are also conducted. Conductivity and pH are checked continuously or with each use. The water suitability test is performed annually and the USE test is performed quarterly.

Prior to first use, a sterility check with non-selective growth media is performed on each batch of reagent water prepared in the laboratory.

9.2 GLASSWARE WASHING AND STERILIZATION PROCEDURES

Glassware washing and preparation/sterilization procedures are performed according to EPA guidelines and are outlined in SOP #030701, *Glassware Cleaning*. The glassware used in the mold laboratory is restricted to microscopic slides, cover slips, and screw capped bottles, vials or flasks for preparation of media. Before use, examine microscope slides, and discard items with chipped edges or etched inner surfaces. Prior to use, clean microscopic slides with 70 % isopropyl alcohol. Examine screw-capped bottles, vials or flasks for chipped inner edges that could leak. Screw-capped bottles, vials or flasks are cleaned using the following protocol:

- Prewash with hot tap water. Wash with hot tap water. Wash with non-foaming powder detergent. Rinse with tap water. Rinse with DI water. Dry and cool.
- New glassware is cleaned according to the same procedure as listed above.

Inspect glassware after washing for excessive water beading and re-wash, if necessary. Perform checks on pH and test for inhibitory residues on glassware and plastic ware. Use utensils and containers of borosilicate glass, stainless steel, aluminum, or other corrosion resistant material for media preparation. Sterilization of any auxiliary equipment is performed via autoclave.

Pipettes of all sizes are checked for sterility by drawing up non-selective media into the pipette and re-dispensing the volume back into original tube that contained the media. The tube is then incubated and monitored for growth. All results are recorded and maintained within the laboratory.

Inoculating loops are cultured by aseptically transferring the entire tip of the loop into a tube containing non-selective media. The tube is incubated and monitored for growth. Results are maintained within the laboratory.

BOD analysis is performed in disposable, pre-sterilized bottles. In the event that glass bottles must be used, the BOD glassware is washed in a commercial laboratory dishwasher using a phosphate free detergent, followed by a nitric acid rinse, with a final rinse of laboratory DI water.

9.3 MEDIA STERILITY VERIFICATION PROCEDURES

A sterility check must be analyzed for each lot of pre-prepared media and for each lot of media prepared in the laboratory. This is done prior to the first use of the media used for membrane filtration, or MPN, or pour plate, and chromofluorogenic methods. For media used in the pour plate testing technique, sterility blanks of the media must be made by pouring an uninoculated plate for each run. All results are documented.

9.4 POSITIVE AND NEGATIVE CONTROLS USING PURE CULTURES

Positive culture controls demonstrate that the media can support the growth of the target organism(s), and that the media produces the specified or expected reaction to the target organism(s). All prepared media must be tested with at least one pure culture of a known positive reaction. This must be done prior to first use of the media.

Negative culture controls demonstrate that the media does not support the growth of non-target organisms or does not demonstrate the typical positive reaction of the target organism(s). All batches of prepared selective media in the laboratory must be analyzed with one or more known negative culture controls. This must be done prior to first use of the media.

New lots of commercially-prepared media are evaluated for suitability using a known positive and negative culture prior to use.

10.0 ANALYTICAL PROCEDURES

A list of laboratory SOPs associated with the Mold and BOD laboratory can be found in the following table:

TABLE 10.1: MOLD DEPARTMENT SOPs

This Table is subject to revision without notice

SOP #	Title
340303	Biochemical Oxygen Demand
350306	Spore Traps
350307	Fungal Andersen
350308	Fungal Quantification
350309	Fungal RODAC
350310	Direct Exam Prep Procedure

SOP #	Title
350311	Fungal Identification
350312	Mold QA/QC
350313	Mold Lab Safety
350314	MUG – E. coli/Coliforms/Enterococcus
350319	Processing of Bacterial Andersen Samples for Quantification
350334	Microscope Usage
350335	Fungal Spore Identification
350342	BART Testing
350347	Processing of Bacterial Swabs, Bulk, Dust and Water Samples for Quantification
350349	Bacterial Identification Using Biolog
350352	Anaerobic Plate Count
350367	Labconco Flaskscrubber Operation and Maintenance
350370	Preparation of Culture Media
350371	Mold lab Autoclave Maintenance and Operation
350379	Mold Lab Reference Culture Maintenance

11.0 QUALITY CONTROL CHECKS

11.1 ESC participates in proficiency testing (PTs) in support of various laboratory accreditations/recognitions. For Mold analyses, PTs are administered quarterly by AIHA-PAT. ESC participates in both the EMPAT Fungal Direct Examination and Bacterial/Fungal Culturable proficiency testing. The samples are received and analyzed by method according to the vendor's instructions and according to the applicable analytical SOP.

For BOD analysis, environmental PTs are purchased from Phenova. The WP studies are completed every 6 months.

11.2 As part of the total spore analysis QC, the laboratory maintains a slide collection with various count levels and genera/groups of spores. Acceptance criteria for the slide collection include counts that are statistically determined (e.g. ±3STD). Each analyst reviews one slide from this collection on each day of analysis. The slides are reviewed on a rotational basis such that a different slide is reviewed each day until the entire slide collection has been examined. The total spore count and acceptance criteria for each slide are calculated and compared with the statistically determined acceptance criteria.

11.3 Each week, a different pure culture is chosen from the culture collection and is identified by an analyst as part of training and continuing QC program.

11.4 Inter- and intra-analyst precision is determined by the re-analysis of samples by the same and different analysts (where possible). The rate of re-analysis by the same analyst (intra-analyst) and by a second qualified analyst (inter-analyst) is 5%, or at least one each month samples are received, for each field of testing. The laboratory uses control charts to compare the intra- and inter-analyst performance to an established control limit.

11.5 Media blanks for viable count analysis are used to monitor media and laboratory procedures for contamination. These blanks are utilized in two ways:

- Laboratory media blanks are unexposed fresh media (either recently received from the manufacturer or newly laboratory prepared) that is incubated under the same conditions as those used for analysis.
- Field blanks are unopened media that is handled identically to field samples. These samplers are returned to the laboratory with sampled media to demonstrate that media utilized was not originally contaminated and did not become contaminated during transport.

11.6 Environmental monitoring of the laboratory air and the surfaces in the Mold laboratory is performed monthly. BSLII hoods are also monitored in the Mold laboratory.

11.7 Round Robin studies are performed for direct examination of fungal air samples in accordance with AIHA-LAP policy requirements. Results for these studies include raw counts and final concentrations for each fungal structure. Acceptance criteria include organism identification, ranking and quantification.

11.8 Analysts also participate in other continuing education activities, including attending seminars and conferences, in-house training meetings, reviews of journal publications and self-taught training on CD.

11.9 For BOD analysis, Initial Demonstrations of Capabilility (IDOCs) are performed during new analyst training and/or prior to acceptance and use of any new or modified method/instrumentation. Continuing Demonstration of Capability must be updated at least annually. The associated data is filed within the department and available for review.

11.10 For BOD analysis, samples are analyzed in batches of 1-20 samples. Each batch must include the following: method blank, seed blank, seed control, seed check, a laboratory control sample run in triplicate, 1 sample duplicate/ 10 samples. A calibration check (CCV) is performed every 10 samples and an additional LCS every twenty samples including the end of the sequence.

11.10.1 A method blank is analyzed for each probe at the beginning and end of the sequence. The method blank is used to define the level of laboratory background and reagent contamination. All blanks must meet method acceptance criteria. If method blanks fail, data is qualified. The depletion of the method blank must be < 0.20mg DO/L but no lower than -0.20 mg DO/L. Multiple dilution water blanks in the same batch using the same dilution water are treated as replicates and averaged. The average of the dilution water blanks in a batch must not be more than 0.20 mg DO/ L.

11.10.2 The Seed Blank/Seed Control/Seed Check must deplete to show that the microorganism population is viable. The seed correction factor should be 0.6-1 mg/L and seed check and seed control should show depletions within 30% between dilutions.

11.10.3 The CCV should not vary more than 0.2mg DO/L within a run.

11.10.4 The BOD value for the LCS must be within 167.5 and 228.5 mg/L.

11.10.5 The RPD for the sample duplicate must be ≤30% for high and low values.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in SOP #030201, *Data Handling and Reporting* and ESC SOP# 030227, *Data Review* The primary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP is followed
- Sample preparation is correct and complete
- Analytical results are correct and complete
- QC is within criteria and complete

For BOD analysis, the Laboratory Manager or Senior Analyst performs the secondary review of the data package using the ESC SOP# 030227, *Data Review*. The reviewer verifies that the analysis is performed as required and meets method criteria, All associated data is present and complete, and also ensures that any additional documentation is completed as required (i.e. required qualifiers on test reports, case narratives, etc.)

TABLE 12.1 Data Reduction Formulas

PARAMETER	FORMULA
Non-viable (Spore Traps) Mold	$\frac{SporeCount}{m^3} = \frac{\text{number on trace} \times 1000}{\text{Volume of air sampled in liters}}$
Andersen Fungal Viable (Culturable) Mold Spore Andersen Bacterial Viable (Culturable) Bacteria	$\frac{CFU}{m^3} = \frac{\text{raw counts} \times 1000}{\text{Volume of air sampled in liters}}$ $P_c = N\,[1/N + 1/N\text{-}1 + 1/N\text{-}2 + \ldots\ldots 1/N\text{-}r+1]$
Quantitative Fungal/Bacterial	$\frac{CFU}{gm}$ or $\frac{CFU}{Swab} = \frac{\#\text{ of Colonies} \times \text{Dilution Factor}}{\text{Sample Amount}}$
BOD, 5-DAY	$\frac{\text{Initial D.O.} - \text{Final D.O.} - CF}{\%\text{ Dilution Sample}}$ *Calculations are performed by computer software* *CF= (Depletion of Seed Control or Seed Check) X (Vol of Seed in Samples)/Volume of Seed in Seed Control or Seed Check*

PARAMETER	FORMULA
Percent Recovery (%R)	%R = (Observed Value)X(100%) / True Value
Relative Percent Difference (RPD)	RPD = [ABS(Result1-Result2)]X(100%) RPD = [ABS(Result1-Result2)]X(100%)Mean Result
Reporting Limit (RL)	RL (1 ppm) X Final Volume (300 ml)/Initial volume X Dilution Factor

12.2 VALIDATION

The validation process consists of data generation, reduction review, and reporting results. Once data reduction is complete, validation is conducted by reviewing all data entries and calculations for errors, reviewing all documentation to assure that sample information is correct, and that the tests have been performed appropriately and within the appropriate holding times. The secondary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP is followed
- Sample preparation is correct and complete
- Analytical results are correct and complete

For BOD analysis, once data reduction is complete, validation is conducted by verification that the QC samples are within acceptable QC limits and that all documentation is complete, including the analytical report and associated QC. See Table 12.3 for current QC targets, controls and current reporting limits for BOD analysis.

12.3 REPORTING

Reporting procedures are documented in SOP #030201, *Data Handling and Reporting.*

BOD Control Limits: BOD QC targets are statutory. The laboratory calculated limits verify the validity of the regulatory limits. The BOD QC targets are within the range of 5 to 15% for accuracy, depending on determinative method requirements, and, where applicable, <30% RPD for precision, unless laboratory-generated data indicate that tighter control limits can be routinely achieved. When using a certified reference material for QC sample analysis, the acceptance limits used in the laboratory conform to the provider's certified ranges for accuracy and precision.

Table 12.3: QC Targets for BOD Lab Accuracy (LCS), Precision and RLs *This table is subject to revision without notice*					
Analyte	**Analysis Method**	**Matrix**	**Accuracy Range (%)**	**Precision (RPD)**	**RL (ppm)**
Biochemical Oxygen Demand	SM5210B	W	85-115	≤30	1
Biochemical Oxygen Demand - Carbonaceous	SM5210B	W	85-115	≤30	1

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CARs are kept on file by the Regulatory Affairs Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

13.2 Required Corrective Action

Control limits are established for each type of analysis. When these control limits are exceeded, corrective action must be taken.

All samples and procedures are governed by ESC's quality assurance program. General corrective actions are followed; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate SOP.

13.2.1 Laboratory QC Criteria and Appropriate Corrective Actions

If the analytical method contains acceptance/rejection criteria and it is more stringent than those controls generated by the laboratory the method criteria takes precedence.

13.2.2 Out of Control RPD for inter- and/or intra-analyst reanalysis.

Rejection Criteria - RPD value of the original analysis is calculated and must be below the current control limit.

Corrective Action - Both first and second analysts re-analyze the sample until a consensus is reached and the RPD value falls within control limits.

13.2.3 Out of Control RPD for inter-analyst analysis.

Rejection Criteria – All organisms must be accurately identified.

Corrective Action - Both first and second analysts review the sample. The second analyst results are reported to the customer.

13.2.4 Calibration Verification criteria are not met: BOD Analysis

Rejection Criteria see section 8.4

Corrective Action- If the CCV fails, the data may still be used. If the failure persists, check cleanliness of the equipment and stability of the DO probe for subsequent runs. If a problem persists, the group supervisor or Regulatory Affairs Department is notified for further action.

13.2.5 Out of Control Blanks: Applies to Method Blank

Rejection Criteria- Blank depletion is greater than established limit of -0.2 mg DO/L and + 0.2 mg DO/L.

Corrective Action - If the average of the blanks fail, all data must be reported with a qualifier

13.2.6 Out of Control Laboratory Control Standards (LCS)

Rejection Criteria - If the performance of associated laboratory control sample(s) is outside of acceptance limits as listed in Section 12.

Corrective Action - All samples bracketed by the failed LCS must be reported with a qualifier.

13.2.7 Out of Control Duplicate Samples

Rejection Criteria - Lab-generated maximum RPD limit (as listed under precision in Section12)

Corrective Action - The sample and duplicate are reported with a qualifier.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #030230, *Standards Logger, SOP #030227, Data Review* and SOP #030201, *Data Handling and Reporting*

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 13.0 and *SOP #010104, Internal Audits*.

” ”

16.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix XI)	General - Replaced the term “client with the term “customer . Also changed references to AIHA to AIHA-LAP or AIHA-PAT as appropriate. Table 8.1 – Updated Equipment List Table 8.2 – Revised ATC check frequency for pH meters to quarterly Tables 8.3A and 8.3B – Updated Agars Table 8.3C – Added pH=4 buffer Section 8.4 – Revised ATC check frequency for pH meters to quarterly Table 10.1 – Updated SOP list

1.0 SIGNATORY APPROVALS

Protozoa Laboratory
QUALITY ASSURANCE MANUAL

APPENDIX XII TO THE ESC QUALITY ASSURANCE MANUAL

for

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Prepared by

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NOTE: The QAM has been approved by the following people.

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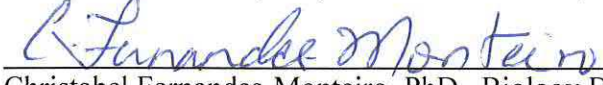

Christabel Fernandes-Monteiro, PhD., Biology Department Manager 615-773-9683

2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This manual discusses specific QA requirements for EPA Methods 1622 and 1623 to ensure that analytical data generated from the protozoan laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the customer with both routine and specialized services, field sampling guidance and materials and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in Section 4.0 in the *ESC Quality Assurance Manual.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Dr. Christabel Fernandes-Monteiro, with a Ph.D. in Applied Biology, is the Department Manager of Biology. She oversees supervision of laboratory operations in the Mold, Aquatic Toxicity, Microbiology, Protozoan and BOD laboratories. Her responsibilities include assurance of reliable data through monitoring of quality control, corroborating the analysis performed, protocol development, coordination with customers regarding sample analysis, scheduling of tests and overall production in all sections within the Biology Laboratory, including management of staff. In her absence, Stacy Kennedy assumes her responsibilities in the Protozoan laboratory.

Stacy Kennedy, with a M.S. degree in Biotechnology, is the Principal Analyst for the Protozoan laboratory. Ms. Kennedy is proficient in performing EPA Methods 1622 and 1623. She gained analytical experience from a certified EPA Protozoan Principal Analyst and obtained additional training on microscopic techniques. Also, she frequently reviews EPA online training modules related to the methods being performed.

5.2 TRAINING

The Principal Analyst trains all new analysts in the Protozoan laboratory according to ESC protocol and EPA guidelines. ESC's training program is outlined in SOP #350405, *Training Protocol for Method 1622/1623* and is in accordance with *Supplement 2 to the 5th Edition of the Manual for the Certification of Laboratories Analyzing Drinking Water.* Documentation of training received and authorizations to perform these analyses are maintained within the department.

6.0 FACILITIES AND LABORATORY SAFETY

6.1 FACILITIES

The main area of the laboratory is approximately 420 square feet and has roughly 67.5 square feet of bench area. The microscope dark room is located in the back of the laboratory is 36 square feet with 18 square feet of bench area. Additionally, there is 40 square feet of storage and fluorescent lighting throughout all areas. The air handling system is a five-ton Trane split unit with natural gas for heating. The laboratory reagent water is provided through the Siemans Elga UltraPure deionizer system. Biohazard containers are located in the protozoan laboratory and Stericycle serves as ESC's biological waste disposal contractor. ESC's building information guides and site plan are shown in Appendix I.

6.2 LABORATORY SAFETY

- Laboratory access is limited when work is being performed.
- All procedures where infectious aerosols or splashes may occur are conducted in Biological Safety II cabinets.
- The following Biosafety Level 2 (BSL2) guidelines are adhered to:
  - Closed-toe shoes are worn in the laboratory
  - Floors and work surfaces are cleaned on a regular basis
  - Emergency numbers are posted in the laboratory
  - Biological safety hoods are tested and certified annually
  - Laboratory personnel are trained in the use of the biological spill kit and emergency safety equipment
- ESC's laboratory safety guidelines are detailed in SOP #350408, *Biosafety Guidelines for the Cryptosporidium Laboratory*.

7.0 SAMPLING PROCEDURES

7.1 FIELD SAMPLING PROCEDURES, SAMPLE STORAGE, AND HANDLING

- A description of field sample collection, containers, storage, temperature, and transport times are located in SOP #350402, *Method 1622/1623 Field-Filtering Sample Collection and Laboratory Delivery* and SOP #350403, *Method 1622/1623 Bulk Sample Collection and Laboratory Delivery.*
- Laboratory sample identification, handling, tracking and the information recording system are found in the following procedures: SOP #350404, *Method 1622/1623 Sample Receiving* and SOP #060105, *Sample Receiving*.

- A Chain of Custody and LT2 Sample Collection Form accompanies all compliance samples received by the lab. This is necessary to prove the traceability of the samples and to document the change in possession from sampling through receipt by the laboratory. Prior to analysis, all samples are checked for integrity.
- Following analysis, the slides are maintained for a minimum of 2 months and disposed of following all State and Federal regulations governing disposal.
- Requirements for sample acceptance are located in SOP #350404, Section 7.0, *Method 1622/1623 Sample Receiving*.

8.0 EQUIPMENT

Laboratory equipment specifications are outlined in SOP #350407, *Microscope Analyst Verification,* SOP #350410, *IEC CRU-500 Centrifuge Operation and Maintenance,* SOP #350411, *Lab-Line Multi-Wrist Shaker Operation and Maintenance* and SOP #350413, *Olympus BX40 Microscope Operation and Maintenance.*

8.1 EQUIPMENT LIST

TABLE 8.1 – LABORATORY EQUIPMENT LIST: MAJOR ITEMS - Protozoan

Item	*Manufacturer*	*Model*
Flow control valve	Plast-o-matic	FC050B
Centrifugal pump	Jabsco	18610-0271
Graduated container	Nalgene	20 Liter Carboy
Laboratory shaker	Lab-Line	3587-4
Laboratory shaker side arms	Lab-Line	3589
1500 XG swinging bucket centrifuge	Damon/IEC Division	CRU-5000
Sample mixer/rotator	DYNAL	Cat#: 947.01
Magnetic Particle Concentrator	DYNAL	MPC-1
Magnetic Particle Concentrator	DYNAL	MPC-S
Magnetic Particle Concentrator	DYNAL	MPC-6
Flat-sided sample tubes	DYNAL	Cat#: 740.03
Epifluorescence/differential interference contrast microscope	Olympus	BX-40
Excitation/band pass microscope for fluorescein isothiocyanate (FTIC)	C-Squared	UN3100
Excitation/band pass filters for 4',6-diamidino-2-phenylindole (DAPI)	C-Squared	UN41001

8.2 EQUIPMENT PREVENTIVE MAINTENANCE, EQUIPMENT CALIBRATION

Calibration of equipment is conducted on an annual and/or semi-annual basis and is documented. Maintenance and cleaning is conducted on an as needed basis or per manufacturer's instructions. Equipment cleaning is specified in SOP #350412, *Cryptosporidium Laboratory Equipment Cleaning.*

TABLE 8.2 – PREVENTATIVE MAINTENANCE AND CALIBRATION FOR LABORATORY EQUIPMENT		
INSTRUMENT	***P. M. DESCRIPTION***	***FREQUENCY***
Balances (Top Loader or Pan)- capability of detection of 0.1 g for a load of 150 g, and 1 mg for a load of 10 g or less.	Service/Calibration (maintenance and calibration check) Verified using ASTM Class 1,2, or 3 weights Non-reference weights should be calibrated	Annually by a qualified independent service tech Monthly Every six months
pH meter	Electrodes should be maintained Slope determination Meter standardized with pH 7.0, and either 4.0 or 10.0 pH buffers	Per manufacturer's instructions Monthly (Acceptable slope= 95-105%) Each use period
Thermometer- Glass and Electronic Continuous recording devices Reference Thermometer	Calibration checked with NIST certified traceable reference thermometer or one traceable to a NIST reference thermometer Re-calibrated Re-calibrated	Annually Annually Annually by a certified service technician
Autoclave	Maintenance Check Sterilization efficiency Maximum temperature registering Automatic timing mechanism Clean door seals, drain screen, remove debris	Annually by a qualified independent technician Monthly- Geobacillus stearothermophilus ampoule With each use–Chemical Indicator Strip With each use Quarterly As needed
Conductivity Meter	Calibrated using a low level certified traceable standard or determine cell constant	Monthly per manufacturer instructions
Refrigerator	Record temperature	Daily when in use
Micropipettes	Calibrated	Annually
Hand Tally or Digital/Electronic Counter	Checked to confirm accuracy and operational status	Periodically as needed
Centrifuge	Clean and disinfect after spills/leakage Service/Calibration	Periodically as needed Annually by a qualified service technician
Microscope	Service Alignment and adjustment of optics Stage Micrometer calibration Kohler illumination procedure	Annually With each use Annually With each use
DI unit	Manufacturer's instructions	As needed

8.3 STANDARDS AND REAGENTS

Table 8.3A: Stock solution sources, description and related information.
(subject to revision as needed)

Description	Vendor	Concentration	Storage Req.	Expiration
Sodium Hydroxide (NaOH)	VWR	Concentrated	ambient	1 year
Hydrochloric Acid (HCl)	VWR	Concentrated	ambient	1 year
Laureth-12	VWR	--	ambient	1 year
Tris Stock	VWR	--	ambient	NA
EDTA	Sigma-Aldrich	0.5 M, pH 8.0	2 - 8°C	1 year
Antifoam A	Sigma-Alrich	--	ambient	NA
Dynabeads® GC-Combo/Crypto	Idexx	--	2 - 8°C	2 years
Direct labeling kit for det. of oocysts and cysts, Merifluor Cryptosporidium/Giardia	VWR	--	2 - 8°C	1 year
Phosphate Buffered Saline (PBS) Solution, pH 7.4	Sigma-Aldrich	--	ambient	1 year
4', 6-diamidino-2-phenylindole (DAPI) stain	Waterborne, Inc	2mg/mL	2 - 8°C /Darkness	18 months/When positive control fails
Purified, live *Cryptosporidium* oocysts stock suspension	WSLH	--	2 - 8°C	1 month
Purified, live *Giardia* cysts stock suspension	WSLH	--	2 - 8°C	1 month

Table 8.3B: Working Solution Descriptions and Related Information.
(subject to change)

Solution	Concentrations	Storage Requirements	Expiration
Sodium Hydroxide (NaOH)	6.0 N	ambient	1 year
Sodium Hydroxide (NaOH)	1.0 N	ambient	1 year
Hydrochloric Acid (HCl)	6.0 N	ambient	1 year
Hydrochloric Acid (HCl)	1.0 N	ambient	1 year
Hydrochloric Acid (HCl)	0.1 N	ambient	1 year
Laureth-12 stock vials	10g/100mL	0°C to –20°C	1 year
Tris Working Solution	1 M, pH 7.4	ambient	3 months
Elution Buffer	--	ambient	1 week
1X SL Buffer A Solution	--	2 - 8°C	Prepared Daily
Staining 1X wash buffer	--	ambient	3 months
Phosphate Buffered Saline (PBS) Solution, pH 7.4	--	ambient	1 week
Working DAPI stain	10µL Stock/25ml Phosphate Buffer	Ambient/Dark container	1 day

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

ASTM Type II grade water: Reagent water is analyzed for total chlorine, heterotrophic bacteria, specific conductance, pH, total organic carbon, ammonia and organic nitrogen on a monthly basis. Reagent water is tested for metals: Lead, Cadmium, Chromium, Copper, Nickel, and Zinc on an annual basis. A Use Test is performed on a quarterly basis. Reagent water used for preparing reagents must meet the following acceptance criteria:

Parameter	Limits	Frequency
Conductivity	>0.5 megaohms or <2 µmhos/cm (µseimens/cm) at 25 deg C	Monthly
Pb, Cd, Cr, Cu, Ni, Zn	Not greater than 0.05mg/L per contaminant. Collectively not greater than 0.1mg/L	Annually
Total Residual Chlorine	< 0.1 mg/L	Monthly
Heterotrophic Plate Count	<500 CFU/mL or MPN <500/mL	Monthly

9.2 GLASSWARE WASHING AND STERILIZATION PROCEDURES

Glassware washing and preparation/sterilization procedures are outlined in SOP #350414, *Steamscrubber Operation and Maintenance,* SOP #350408, *Biosafety Guidelines for Cryptosporidium Laboratory* and SOP #350412, *Cryptosporidium Laboratory Equipment Cleaning*.

Laboratory glassware and plasticware are checked for acceptability prior to use. Glassware acceptance criteria are documented in SOP #350412, *Cryptosporidium Laboratory Equipment Cleaning*.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated with the protozoan laboratory can be found in the following table:

TABLE 10.1: PROTOZOAN DEPARTMENT SOPs

This Table is subject to revision without notice

SOP #	Title
350401	Isolation & Identification of *Giardia* and/or *Cryptosporidium* in Water
350402	Method 1622/1623 Field-Filtering Sample Collection and Laboratory
350403	Method 1622/1623 Bulk Sample Collection and Laboratory Delivery
350404	Method 1622/1623 Sample Receiving
350405	Training Protocol for Method 1622/1623
350406	Data Collection and Verification for Method 1622/1623

SOP #	Title
350407	Microscope Analyst Verification
350408	Biosafety Guidelines for *Cryptosporidium* Laboratory
350409	IPR, OPR and MS Spiking Procedures and Corrective Actions
350410	IEC CRU-5000 Centrifuge Operation and Maintenance
350411	Lab-Line Multi-Wrist Shaker Operation and Maintenance
350412	*Cryptosporidium* Laboratory Equipment Cleaning
350413	Olympus BX40 Microscope Operation and Maintenance
350414	Steamscrubber Dishwasher Operation and Maintenance

10.2 The following references are used for analytical procedures conducted in the laboratory:

- EPA. Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA, December 2005.
- EPA. Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA, December 2005.
- EPA. Microbial Laboratory Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule. February 2006.
- Supplement 2 to the Fifth Edition of the Manual for the Certification of Laboratories Analyzing Drinking Water, EPA 815-F-12-006, November 2012

11.0 QUALITY CONTROL CHECKS

11.1 ESC participates in proficiency testing (PT) through the analysis of spiked vials received from Wisconsin State Laboratory of Hygiene (WSLH) and analyzed according to study instructions and the ESC SOP. When the analysis is completed, the results are reported to the PT sample provider who issues the testing results as either a "pass" or "fail" to all regulatory agencies, as requested by ESC. If the laboratory fails a PT round, a follow-up test is performed in an attempt to meet the necessary requirements for proficiency. If the follow-up test results in a second failure, the laboratory takes part in re-training .

11.2 An Initial Precision and Recovery test (IPR) is performed prior to the first time the method is used and at any time the method or instrumentation is modified. The IPR consists of four reagent water samples spiked with 100-500 oocysts from a spiking vial received from Wisconsin State Laboratory. Recoveries from the IPR must fall within the EPA approved QC limits: Oocysts= 24- 100% and Cysts= 24-100%, and the Relative Standard Deviation (RSD) of the four recoveries should be less than or equal to 55% for Cryptosporidium, and less than or equal to 49% for Giardia.

11.2 An Ongoing Precision and Recovery sample (OPR) is analyzed once weekly or per 20 samples, and before any field samples are processed. The OPR is spiked with 100-500 cysts and/or oocysts from a spiking vial received from the WSLH. Recoveries from the OPR must fall within EPA approved QC limits: Oocysts = 33-100% and Cysts = 14-100%.

11.3 A Method Blank is also analyzed at least once weekly or per every 20 samples processed, and before any field samples are processed. The Method Blank must be free of test organisms and serves as a sterility control on the analytical system.

11.4 If either sample falls outside acceptance parameters, corrective action must be taken and the samples re-analyzed until the QC criteria are met. Customer samples may only be analyzed following acceptable QC sample results. Quality control information is located in SOP #350409, *IPR (Initial Precision and Recovery), OPR (Ongoing Precision and Recovery) and MS (Matrix Spike sample), Spiking Procedures and Corrective Actions.*

11.5 Customers are required to send a duplicate sample early in their sampling schedule and then again after every 20 field samples collected. This duplicate is utilized in the laboratory as a Matrix Spike (MS). The MS is spiked in the same manner and with the same number of organisms as the OPR to determine the effects of the matrix on the analytical process. The recoveries from matrix spike /matrix spike duplicates must fall within the EPA approved QC limits for oocysts= 13-111% and cysts= 15-118%.

11.6 Inter/intra-analyst precision is determined, at least monthly for verification of analyst performance to assess and maintain consistency in slide examination among analysts. Quality Control information is located in SOP #350407, *Microscope Analyst Verification.*

11.7 Control charts of OPR and MS recoveries are maintained in the laboratory. The control charts graphically display the results of continuing performance when using Methods 1623 and 1622. If recoveries fall outside the control limits, or declining trends are observed, corrective action must be taken to investigate the potential causes of the outlying result.

11.8 Positive staining controls are used to verify that the FITC and DAPI stains are fluorescing at the appropriate intensity and uniformity. Negative staining controls are examined to verify that no oocysts or interfering particles are present. Both staining controls are examined using protocols as stated in ESC SOP # 350401 and meet criteria for EPA 1623 or EPA 1622.

11.9 IMS controls are used in the event of low recoveries to rule out any IMS steps as the cause. The IMS controls are processed beginning with the IMS procedure using protocols as stated in ESC SOP #350401, and meet criteria for EPA 1622 or EPA 1623.

12.0 DATA REDUCTION, VALIDATION AND REPORTING

12.1 DATA REDUCTION

- The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. Data reduction steps applied to the raw data are outlined in SOP #350401, *Isolation and Identification of*

Cryptosporidium and/or Giardia in Water and SOP #350406, *Data Collection and Verification for Method 1622/1623.*

12.2 VALIDATION

Guidelines for data validation are found in SOP #350406, *Data Collection and Verification for Method 1622/1623.* In general, data integrity involves reviewing all data entries and calculations for errors, reviewing all documentation to assure that sample information is correct and complete, and that the tests have been performed appropriately and within the appropriate sample holding times. The secondary analyst reviews the quality of data based on the following guidelines:

- The appropriate SOP is followed
- Sample preparation is correct and complete
- Analytical results are correct and complete

12.3 REPORTING

Reporting procedures are documented in SOP #350406*, Data Collection and Verification for Method 1622/1623.* Depending on the needs of the customer, one or more of the following may be included: Case narrative, Chain of Custody, Internal Chain of Custody, Final Report, Raw Data, etc. When the package involves more than just QC forms, it must contain a Table of Contents and Pagination. When the package is complete, it must be reviewed first by the Primary Analyst followed by the Department Manager or second qualified analyst. The final reviewer signs that the information is complete and the package is ready for submission to the customer. A copy of the final package must be kept on file.

13.0 CORRECTIVE ACTION

13.1 In the event that a nonconformance occurs in conjunction with the analytical batch, a corrective action response (CAR) form must be completed. The cause of the event is stated on the form and the measures taken to correct the nonconformance clearly defined. The effectiveness of the corrective action must be assessed and noted. The CARs are kept on file by the Regulatory Affairs Department. Corrective action procedures are documented in SOP #030208, *Corrective and Preventive Action*

Corrective action procedures that are specific to Cryptosporidium and Giardia analyses are documented in the SOP #350409, *IPR (Initial Precision and Recovery), OPR (Ongoing Precision and Recovery) and MS (Matrix Spike sample), Spiking Procedures.*

13.2 Required Corrective Action

Control limits have been established for each type of analysis. When these limits are exceeded, corrective action must be taken. Calculated sample spike control limits are also used.

All samples and procedures are governed by ESC's quality assurance program. General corrective actions are as follows; however additional and more specific direction is provided in the specific determinative procedure. For more information, see the appropriate determinative SOP.

13.2.1 If a spiked sample or set of samples fails to meet quality control limits

Rejection Criteria - Recoveries from the OPR fall beyond the approved QC limits.

Corrective Action - Examine the spiking suspension organisms directly. To determine if the failure of the spike is due to changes in the microscope or problem with the antibody stain, re-examine the positive staining control, check Kohler illumination, and check the fluorescence and DAPI. To determine if the failure of the spike is attributable to the separation system, check the system performance by spiking a 10mL volume of reagent water with 100-500 cysts and/or oocysts and processing the sample through the IMS, staining and examination procedures. Recoveries should be greater than 70% of the expected concentration. If the failure of the spike is attributable to the filtration/elution/concentration system, check the system performance by processing spiked reagent water according to the method and filter, stain and examine the sample concentrate. This process is performed until the cause of the failure is isolated and corrected. The sample then must be re-analyzed until acceptable results are achieved.

13.2.2 Method Blank contains positive organism when analyzed.

Rejection Criteria – The Method Blank must be free of test organisms and serves as a sterility control on the analytical system.

Corrective Action - Equipment used to process the sample may be cleaned and/or replaced. Reagents used to process the sample may be disposed of and new reagents purchased or prepared. A new method blank is prepared and analyzed. This process is repeated until the method blank passes the acceptance criteria.

13.2.3 Inter/intra-analyst precision analyses are beyond $\pm$10%.

Rejection Criteria – Results for inter and/or intra-analyst precision must be within 10% of original results.

Corrective Action - The differences are discussed between analysts until a consensus is found.

13.2.4 Holding time on sample exceeded or not received at appropriate temperature.

Rejection Criteria - The sample not received on day of collection must be received at the laboratory at $\leq$ 20.0°C and not frozen, and within 96 hours holding time.

Corrective Action - The samples must be re-collected.

13.2.5 Positive and Negative staining controls fail.

Rejection Criteria - If a positive and negative staining control fails all slides that were stained in that batch have failed and samples must be re-collected.

Corrective Action - If positive staining control fails due to faintness, fading or diffusion of the DAPI stain, the holding time may be reduced, or the concentration of the DAPI staining solution may be adjusted so that fading or diffusion does not occur. This process is performed until the cause of the failure is isolated and corrected. The sample then must be re-analyzed until acceptable results are achieved.

14.0 RECORD KEEPING

Record keeping is outlined in SOP #030230, *Standards Logger, SOP #030227, Data Review* and SOP #030201, *Data Handling and Reporting*

Hard copy data of benchsheets and slide examination forms for all compliance monitoring samples, including both field and MS samples, and OPR samples and MB are archived. Benchsheets and slide examination forms for all ongoing PT samples are stored in the laboratory. Documentation for IPR and initial PT data for each method variation used for compliance samples is also archived in the laboratory.

15.0 QUALITY AUDITS

System and data quality audits are outlined in the ESC Quality Assurance Manual Version 13.0 and *SOP #010104, Internal Audits*.

” ”

16.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix XII)	General - Replaced the term “client with the term “customer Table 8.3A – Updated vendors Section 11.5 – Added MS/MSD criteria

1.0 SIGNATORY APPROVALS

RADIOCHEMISTRY LAB QUALITY ASSURANCE MANUAL

APPENDIX XIII TO THE ESC QUALITY ASSURANCE MANUAL

for

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Prepared by

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NOTE: The QAM has been approved by the following people.

Ron Eidson, Director of Radiochemistry 918-251-2515

Jim Brownfield, Compliance Director 615-773-9681

Steve Miller, Quality Assurance Director, 615-773-9684

2.0 APPENDIX TABLE OF CONTENTS

3.0 SCOPE AND APPLICATION

This manual discusses specific QA requirements for general analytical protocols to ensure analytical data generated from the Radiochemistry Laboratory are scientifically valid and are of acceptable quality. Any deviations from these requirements and any deviations that result in nonconforming work must be immediately evaluated and their corrective actions documented.

4.0 LABORATORY ORGANIZATION AND RESPONSIBILITIES

ESC Lab Sciences offers diverse environmental capabilities that enable the laboratory to provide the customer with both routine and specialized services, field sampling guidance and materials, and broad laboratory expertise. A brief outline of the organization and responsibilities as they apply to the ESC Quality Assurance Program is presented in *Section 4.0 in the ESC Quality Assurance Manual.*

5.0 PERSONNEL AND TRAINING

5.1 PERSONNEL

Ron Eidson, with a BS degree in Chemistry, is the Director of Radiochemistry and is responsible for the overall production of the Radiochemistry Laboratory; including the management of the staff and scheduling. Mr. Eidson has 28 years of hands-on experience in radiochemical analyses and 25 years in Laboratory Management. He developed an expertise in uranium, radium and thorium while managing a lab at a uranium processing facility. He later launched his own radiochemical testing lab and served as Lab Director and Radiation Safety Officer for 20 years. Ron has provided radiological consultation on projects for the NRC, DoD, DOE, EPA, USACE and for many decommissioning and industrial sites. He is often called on to use his exceptional knowledge and understanding of radiochemical processes to solve complicated matrix issues. In his absence, Raymond Thomas assumes responsibility for departmental decisions in the Radiochemistry Laboratory.

Raymond Thomas , with a BS Chemistry and BA Physics, is the QA Officer for the Radiochemistry Laboratory. Mr. Thomas has 28 years of experience in radiochemical analyses. He develops, updates, and maintains Standard Operating Procedures; calibrates and maintains instrumentation for radiochemical analysis; provides an independent review and approval of analytical data and reports; and conducts internal audits.

5.2 TRAINING

5.2.1 All new analysts to the laboratory are trained according to ESC protocol. ESC's training program is outlined in *SOP 030205 Technical Training and Personnel Qualifications.* Training is intended to provide personnel with the information and guidance needed to help maintain a safe work environment for the production of quality results. The following training is provided for all employees and contract personnel:

- Radiation Safety training upon hire and annually thereafter.
- Written training through the use of laboratory Standard Operating Procedures (SOP's). Technicians must read and sign a certificate of understanding of the latest version of the SOP before they are released to perform that job.
- On the job training is used to train personnel in hands-on use of the method and instrumentation.
- Initial Demonstrations of Capability (IDOCs) and Continuing Demonstrations of Capability (CDOCs) are used to demonstrate the ability to perform a method satisfactorily.
- Analyst training records are maintained on file within the department.
- Training courses or workshops on specific equipment, analytical techniques or laboratory procedures are conducted from time to time. The documentation is retained along with other training records.
- Safety training is conducted monthly.
- Data integrity and computer security training is conducted upon hire and annually thereafter.

6.0 FACILITIES, LABORATORY SAFETY, AND LABORATORY WASTE

6.1 FACILITIES

ESC's radiochemical lab currently occupies 7500 square feet in Broken Arrow, OK.

- 24 hour monitored access for the security of samples and data
- Controlled and separated sample storage areas
- Unencumbered work spaces in each lab
- Fully integrated hood system to remove any toxic or hazardous fumes that might be evolved when using organic solvents or that may be formed during an acid digestion. The laboratory fume hood face velocity is checked monthly for optimum face velocity.
- Laboratory Information Management System (LIMS) for sample tracking
- On-site and secure data archive area
- File backup to prevent loss of data

6.2 LABORATORY SAFETY

It is management's responsibility ensure that the work environment is safe for all employees and that conditions facilitate correct performance of the environmental tests. The following are just a few measures taken at ESC:

- Sign In Log – all employees and visitors are required to sign in and out of the laboratory. The last employee present is not permitted to perform analyses alone.
- Protective Eyewear, Gloves and Lab Coats – these are provided and are to be worn at all times in the sample preparation section of laboratory.
- TLD (Thermoluminescent Dosimeter) – badges are provided for all employees and visitors to detect possible beta and gamma radiation sources and are to be worn at all times in the laboratory.
- Training – All employees receive training relevant to their particular job prior to beginning the job. Standard Operating Procedures must be read and are available to reference at all times. Monthly Health & Safety training is provided to reiterate the need for attention to detail and Radiation Safety Training is conducted upon hire and annually.
- Safety Equipment – safety showers, eyewashes and fire extinguishers are checked monthly to ensure proper functionality.
- Adequate space and equipment – are provided as available to ensure optimum safety of our employees.
- Internal Audits – are conducted at least annually to ensure laboratory procedures are conducted not only in accordance with quality standards but in a safe manner.
- Constant monitoring – Airflow, temperature and barometric pressure are monitored to ensure a comfortable environment safe from fumes.
- Radiation Surveys – All solid samples are surveyed upon receipt and segregated if radiation is found. Laboratory countertops, floors and instrumentation are frequently surveyed to prevent contamination.
- Segregation – Incompatible areas are separated; standards and samples are segregated as is glassware used for elevated samples.
- Good Housekeeping – daily, monthly and quarterly checklists are followed to ensure cleanliness.

6.3 LABORATORY WASTE

As an active member of the environmental industry, ESC is aggressively interested in the preservation and cleanup of our environment. Any waste generated in the laboratory is disposed in a responsible manner. It is a policy at ESC that all hazardous or radioactive samples and any waste corresponding to these samples are returned to the client for disposal. In this way, ESC minimizes the amount of radioactive material on site to primarily sources and standards.

Prior to disposal solid wastes and chemicals are properly labeled and packaged. They are then transported to a disposal facility. ESC's main disposal methods are:

- Non-hazardous/non rad soil samples - dumped into waste bin.
- Non-hazardous/non rad water samples - neutralized with lime or Sodium Hydroxide and flushed down sink with sufficient water to thoroughly wash out the sink and pipes.
- Lead Waste - Disposed by a licensed facility or recycled.
- Acid Waste - Neutralized with lime or Sodium Hydroxide and flushed down the acid drain with copious amounts of water.
- Organic Waste From Extractions - Disposed of by a licensed facility or recycled.
- Mercury Waste - Disposed by a licensed facility.
- Oil Waste - If toxic, the oil waste will be disposed of by returning to the client or it is transported to a disposal facility.
- Bioassay Samples – flushed down drain or stool.
- Empty chemical or acid containers are thoroughly rinsed before placing in the general trash. Empty sample containers are disposed of in the general trash after the customer's name has been made unreadable.

7.0 SAMPLING PROCEDURES AND HANDLING OF SAMPLES

7.1 SAMPLING PROCEDURES

SOP GEN-18 outlines the instructions that ESC personnel use to collect specific liquid samples from a customer. The laboratory does not currently provide services for solid samples or development of site specific, customized sampling plans. The sampling and testing directives of the customer are followed with the customer assuming responsibility for the suitability of the sampling plan and satisfaction of permit requirements.

7.2 HANDLING OF SAMPLES

The complete procedure for sample control is outlined in GEN_01. A sample is tracked at ESC from the moment it is received to a point in time that the sample can be disposed of properly. It is logged in as described below and all paper work involved is distributed to parties of interest in a timely fashion. Any special information is clearly stated to avoid delays or the possibility of missed holding times.

Sample Acceptance Policy

When a sample arrives, the sample acceptance policy is implemented by sample custodial personnel. Each sample must meet the following sample acceptance criteria or it is flagged to clearly indicate the nature and substance of the variation:

- A Chain of Custody including a unique sample identification, the date and time of collection, collector's name, preservation type, sample matrix and any special remarks concerning the sample or project;
- Proper and durable sample labeling including a unique sample identification;
- Use of appropriate sample containers and preservation;
- Adherence to specified holding times;
- Adequate sample volume to perform the necessary tests; and
- No signs of damage, contamination or leakage.

When the sample does not meet the sample acceptance criteria, ESC will:

- Retain correspondence and/or records of conversations concerning the final disposition of rejected samples; or
- Fully document any decision to proceed with the analysis of samples not meeting acceptance criteria.
- The condition of these samples will be noted on the COC and lab receipt documents.
- The analysis data will be appropriately "qualified on the final report.

In the event holding times are exceeded or improper preservations or containers are used, the client is notified immediately. If the client approves continuation of analyses, any non-conformances are clearly stated on the final report.

Sample Survey and Inspection

Upon arrival at the laboratory, a sample container's exterior is inspected and surveyed for damage or contamination. All shipping containers should be opened in a well-ventilated area. If hazardous materials are suspected, the container will be opened under a hood.

Prior to the removal of samples, absorbent pads should be laid out to receive sample bottles. The SC will note on the Sample Log-in Sheet the following:

- Condition of container, noting any damage, etc.
- Presence/absence of COC seals and their condition
- Sample condition (intact, broken, leaking, cold or ambient, headspace, surface contamination, etc.).
- Presence/absence of sample labels.
- Compare for agreement between sample labels and COC record.
- Samples that are not listed on the COC record will be noted and the client contacted.
- Odors noticed after opening the shipping container are noted.

Sample Log-in and Labeling

All sample information from the Chain of Custody is entered into the Laboratory Information Management System (LIMS). The SC will assign a unique eight digit laboratory log number to each sample. Laboratory sample numbering is comprised of a log number followed by -01 for the first sample, -02 for the second sample, etc. If there is more than one sample container per sample (i.e. one container preserved with nitric acid for metals and three VOA vials for volatiles), the individual containers will be labeled with the proper eight digit log number plus the two digit sample ID plus the a unique letter (A,B,C etc.) for each container. A durable label containing this laboratory ID number along with the proper preservative and analyses requested is placed on the sample container for identification throughout the entire analytical process. A file folder with the log number printed on it will be created to contain all the analytical information relevant to the project including: signed airbill, signed chain-of-custody, work sheets, raw data, QC reports, analytical report, etc.

Sample Splitting and Preservation

When clients supply their own containers or when bulk samples are received, the SC will split samples and preserve according to EPA requirements giving sufficient aliquots for each analytical procedure that is to be performed. SOP GEN_01 describes sample splitting procedures in greater detail.

- Water Samples – When samples arrive that require non-rad analyses, the SC will split and label the sample into appropriate containers.
- Sediment/Soil Samples – The sample will be made homogeneous after any portion has been removed by one or all the following procedures:
    - Stirring
    - Air drying and grinding
    - Particle separation
    - Quartering

Sample Storage, Custody and Security

Sample control is primarily the responsibility of the Sample Custodian and is maintained at ESC through the use of several tracking systems designed to protect sample integrity from login to disposal or return. Samples are placed in designated storage areas except during laboratory analysis. All laboratory personnel who receive samples are responsible for the care and custody of samples from the time each sample is received until samples are returned to storage. Any subset of the sample will be kept in a designated storage area which is controlled by the sample custodian. At the beginning of every work day all the sample storage areas are unlocked by laboratory personnel. At the end of every day the sample storage areas are locked, and the laboratory is locked with a continuously monitored alarm.

Complete details are outlined in SOP GEN_01.

Sample Disposal

Upon completion of the analysis, the samples are placed on an archive list. Once a month, the SC is responsible for collecting all samples on the archive list that have been completed 30 days or more unless other arrangements have been made. Completed samples and all remains are properly disposed of or returned to the client as necessary. Any sample considered hazardous or radioactive is returned to the client for disposal.

This procedure is fully described in SOP GEN_20.

8.0 EQUIPMENT

8.1 EQUIPMENT LIST

LABORATORY EQUIPMENT LIST: MAJOR ITEMS – Rad Lab
This table is subject to revision without notice

Title	QTY	Make	Model	Serial
Chemchek KPA-11 Kinetic Phosphorescence Analyzer w/ Gilson Sample Changer and Gilson Dilutor 401 Syringe Pump	2	Chemchek	KPA-11	1418986; 649025031; 91-5050024
Canberra 2404 Alpha/Beta Counter	5	Canberra	2404	1090352; 988600/787196;488584
Packard Tri-Carb 2550TR Liquid Scintillation Counter	1	Packard	2550TR	103332
Packard Tri-Carb 2200CA Liquid Scintillation Counter	1	Packard	2200CA	102180
Canberra LB4100 Alpha/Beta Counter	3	Canberra	LB4100U2	13000001; 13000002; 13000000; 117
Canberra Genie 2000 Alpha Spectrometer System	2	Canberra	Genie 2000	see description
Canberra Genie 2000 Gamma Spectrometer System	2	Canberra	Genie 2000	see description
IRIS Intreped II Dual-View ICP	1	Therm	Intreped II	12351
Mercury Analyzer	1	Perkin Elmer	3030B	

8.2 EQUIPMENT MAINTENANCE

All equipment is properly maintained, inspected, and cleaned as an ongoing process according to SOP GEN_17.

Preventative Maintenance

ESC regularly performs preventative maintenance, such as checking fluid levels, to ensure that our equipment runs properly and smoothly with limited down time in accordance with SOP GEN_17.

Troubleshooting and Routine Maintenance

Troubleshooting begins with routine maintenance. It may be performed by ESC personnel or trained personnel from the manufacturer. A controlled log for maintenance is assigned to each instrument as well as for electrode(s). Each log is maintained by the analyst responsible for analytical performance with the particular instrumentation.

Equipment subjected to overloading or mishandling, which gives suspect results, or is proven to be defective will be placed out of service by the Laboratory Tag-Out System (GEN_05). When this occurs, previous calibrations and/or analyses are examined for any effect this may have had.

ESC has back up instrumentation to lessen down-time and ensure timely data delivery.

Equipment Checks

Equipment Check	*Frequency*
Analytical balances	Daily
Oven Temp	Daily
Frig Temp	Daily
Balance Calibration	Daily
DI Water Conductivity	Daily
Pipettes Calibrated	Quarterly
Electronic Pipets	Daily
Fire Extinguisher	Monthly/annual
Hood Velocity	Monthly
Survey Meters	Upon use/annual
Thermometers-liquid	Initial & annually
Thermometer gun	quarterly
Weights	Every 5 years
Air filters replaced	Monthly
Vacuum pump oil	Qtrly or as needed
Hood motors	Qtrly or as needed
Volumetric glassware	Initial/ as needed

8.3 INSTRUMENT CALIBRATION FOR RADIOCHEMISTRY

These and other points such as calibration and verification of reference standards can be found in the GEN_25 and method specific SOP's.

Initial Calibration

Sources used to determine detector efficiency are NIST traceable, prepared from NIST traceable or from a recognized entity such as EPA, DOE or IAEA.

Alpha Spectrometry prepared standards are to be checked by a material mass balance remaining from neodymium fluoride precipitation and rinses. Propagated uncertainties are to be determined.

Check sources are only to be used to verify calibrations and not used for efficiency determinations.

Instrument Calibration Verification

Daily source checks traceable to NIST or equivalent are used to monitor calibration. These sources are separate from the Initial calibration source. These sources are used to monitor counting efficiency, FWHM and energy calibration. Energy calibration is the only adjustment that can be made. Control charts are used to determine whether results are with control limits. Limits are 3σ outlier and 2σ warning.

Background Checks

Background count rates will be determined for each radiation detector system on a routine basis, for systems in regular use. A 1000 minute background count is performed monthly to determine the background subtraction count (BSC). Shorter background counts are performed on a daily basis to monitor contamination on detectors. Alpha Spectroscopy backgrounds are performed weekly. Where applicable, the results of these measurements will be recorded in a log and plotted on a control chart. Appropriate investigative and corrective action will be taken when the measurement value falls outside the pre-determined range of control values. For liquid scintillation counters the background sample is counted prior to samples and for the same count time.

Sample Introduction

For systems in which samples are changed manually, check sources are measured daily. For systems with automatic sample changers, it may be more convenient to include the check source within each batch of samples and thus obtain a measurement of this source within each counting cycle.

For proportional counting systems, the plateau will be checked annually at a minimum. Response to the check source will be checked daily or before each use and after each gas change. Background measurements will be daily or before each use, to ensure that background radiation levels are within the expected range. For systems with automatic sample changers, background or reagent blank measurements will be included within each measurement cycle.

Alpha & Gamma Spectrometers

For alpha and gamma-ray spectrometry systems, energy calibration sources will be counted to determine the relationship between channel number and alpha or gamma-ray energy. The frequency of energy calibration checks depends on the stability of the system, but usually is performed daily for gamma spec. and alpha spec. The results of these measurements will be recorded and compared to predetermined limits to determine whether or not system gain and zero level need adjustment. Adjustments will be made as necessary.

Additional checks needed for spectrometry systems are the energy resolution of the system and the count rate of a check source. These will be performed daily or before each use and after system changes, such as power failures or repairs. This is to determine if there has been any significant change in the system. The results of these measurements will be recorded when the system is in use.

8.4 INSTRUMENT CALIBRATION FOR INORGANICS

Initial Calibration – Inductively Coupled Plasma

Prior to use, the Inductively Coupled Argon Plasma (ICP) is calibrated for every element and every line to be used. A daily calibration with a minimum of five points. The lowest point on the curve must be at or less than the LOQ. The r2 (linear regression) must be greater than or equal to 0.995 to ensure that the instrument has been calibrated accurately.

Continuing Instrument Calibration – Inductively Coupled Plasma

Initial Calibration Verification (ICV) is analyzed immediately following the standards. The ICV is from a different source as the standards and the result of the ICV must fall within 10% of the true value. The Continuing Calibration Verification (CCV) is from the same source as the standards and is analyzed after every ten samples and also must fall within 10% of the true value.

Mercury Analysis

All samples and standards are prepared and analyzed under E.P.A. Method 245.1 or 7470A/7471A. A five point standard curve is used with the sixth point going through zero. The r2 (linear regression) must be greater than or equal to 0.995 to ensure that the

instrument has been calibrated accurately. Initial Calibration Verification (ICV) is analyzed immediately following the standards. The ICV is from a different source as the standards and the result of the ICV must fall within 10% of the true value. The Continuing Calibration Verification (CCV) is from the same source as the standards and is analyzed after every ten samples and also must fall within 20% of the true value.

9.0 LABORATORY PRACTICES

9.1 REAGENT GRADE WATER

ASTM Type II (DI) water is used in the laboratory for dilution, preparation of reagent solutions, and the final rinsing of glassware. It is free from interferences and other contaminants. After passing through two ion exchange canisters and one carbon filter canister, water purity is monitored by an indicator light at each outlet and at the filtration apparatus, and checked daily for conductivity.

9.2 GLASSWARE

Class A volumetric glassware is used by the laboratory for measuring trace constituents in organic and inorganic analysis. Laboratory contamination is minimized by using disposable beakers for digestion purposes when applicable. The Standard Operating Procedure GEN_15 for glassware and labware cleaning is followed to ensure the removal of all traces of parameters of interest and contaminants that could interfere with analysis.

10.0 ANALYTICAL PROCEDURES

10.1 A list of laboratory SOPs associated in the Radiochemistry Laboratory.

11.0 QUALITY CONTROL

NOTE: For specific guidance on each determinative method, including required quality control and specific state requirements/modifications, refer to the relevant laboratory standard operating procedure(s).

Method Blanks

A method blank is analyzed for each batch of 20 samples or less (5%) for each test method. ASTM Type II (DI) water is used in preparation of method blanks.

Standards

Reference standards will be used to determine counting efficiencies for specific radionuclides and calibration check standards for ICP, CV.Calibration Standards have to be certified by the National Institute of Standards and Technology (NIST),

Environmental Protection Agency (EPA) or suppliers who participate in measurement assurance activities with NIST.

Chemical Standards will be prepared using methods reflecting a state of the analytical art and materials of known purity. Commercial chemical standards used will be traceable to NIST or certified by the EPA. Physical Standards and measuring devices will have currently valid calibrations traceable to national standards, primarily NIST.

Calibration certificates, when available, will indicate the traceability to national standards of measurement and will provide the measurement results and associated uncertainty of measurement and/or a statement of compliance with an identified metrological specification. These records can be found in the Quality Assurance Department.

Where traceability to national standards of measurement is not applicable, ESC Lab will provide satisfactory evidence of correlation of results, for example by participation in a suitable program of inter-laboratory comparisons, proficiency testing, or independent analysis.

Determination of QC Limits

Control Charts are generated annually and reestablished after major changes for all analyses routinely performed and are used for trend analysis. Control limits are based on E.P.A. and DoD method recommendations and are +/- 3 times the standard deviation and the warning limits are +/- 2 times the standard deviation. If the control limits exceed the EPA/DoD control limits then the EPA/DoD control limits are used.

Method for Handling Outliers

The method for handling outliers is based on Quality Control, split, and Performance Evaluation Study Program samples. If a LCS sample fails to fall within control limits it will be reanalyzed. If the LCSsample proves to be within specifications, the group of samples the LCS represents will be reanalyzed. If the LCS remains outside control limits, the samples will be re-prepared along with a known standard to identify the problem and where in the process the problem may be occurring.

12.0 DATA COLLECTION, REDUCTION, VALIDATION, AND REPORTING

12.1 DATA COLLECTION

All bench chemists document sample preparation activities in laboratory notebooks. These serve as the primary record for subsequent data reduction. The Alpha/Beta counters generate printouts that are used for calculations generated by a computer or worksheets. The data for alpha and gamma spectrometry, ICP and CV analyses are generated by stand-alone computers. Results of each analysis are transcribed onto Excel spreadsheets specific to the particular analysis. Concentrations of the analytes found in

the analysis are expressed according to the required units, depending on the sample matrix.

Any manual integrations for ICP are documented in the raw data records to show a complete audit trail before and after the manual integration to permit reconstruction of the results. This requirement applies to all analytical runs including calibration standards and QC samples. The person performing the manual integration signs and dates each chromatogram and documents the rationale for performing manual integration (electronic signature is acceptable).

12.2 DATA REDUCTION

Gross Alpha/Beta Results – Calculations are performed on a spreadsheet which calculates the counting efficiency of each sample according to the amount of solids present on the counting planchet. Count times are determined according to the MDA required by the client.

Alpha Spectrometry Results – Calculations are based on the specific area of a target peak along with the addition of a tracer. The target isotope is determined by energy and tracer recovery. In some instances the tracer has to be determined using a gamma spectrometer instead of the alpha spectrometer.

Gamma Spectrometry Results – Calculations are performed for each isotope after its identification is determined. The activity of each isotope is determined using a calibration curve and the peak area of each isotope.

Uranium Analyzer Results – Calculations are performed on each sample by entering the sample aliquot and final volume into the KPA computer prior to analysis. The final results will be rounded to the nearest 0.1 ug/L or three (3) significant figures if the results are larger than 10.

Inductively Coupled Plasma (ICP) – Calculations are based upon the emission intensity given off at a certain wavelength. The final calculations are done by the computer system by comparing intensity of sample against the intensity of known standards.

Atomic Absorption Spectrometry (CV) – Calculations are based on the amount of photometric absorbance at a particular wavelength by a specific metal. The final calculation is done by a computer system by comparing absorbance of sample against the absorbance of known standards.

12.2 VALIDATION

All analytical data must undergo a multi-tiered review process prior to being reported to the customer. Data review is the process of examining data and accepting or rejecting it based on pre-defined criteria. These review steps are designed to ensure that reported data

is free from errors and any non-conformances are properly documented. Standard Operating Procedure GEN_3 addresses data review in detail.

12.3 REPORTING

The final report is generated when all sample analyses are completed, reviewed and approved. The procedure for analytical reporting is GEN_03.

Any discrepancies encountered during the analysis of the samples are to be stated in the Case Narrative. The Case Narrative will discuss any problems encountered during the routine analysis of the samples. The Case Narrative will be printed on lab letterhead as page one of the final report and will be paginated.

After issuance of the report, the lab report will remain unchanged. Material amendments to an analytical report after issue will be made only in the form of a further document, or data transfer including the statement Supplement to Analytical Report , or equivalent wording. Such amendments will meet all the relevant requirements of the TNI and DoD Standard.

13.0 RECORD KEEPING

SOP GEN_3 outlines the complete procedure.

All records, certificates and reports are stored safely and securely and are held in strict confidence. Records which are stored on electronic media are supported by the hardware and software necessary for their retrieval and have hard copy or write-protected backup copies. Access to archived information relating to project files on the LIMS is protected against unauthorized access or amendment. Access to other archived information is documented with an access log. Records are protected against fire, theft, loss, environmental deterioration, vermin and, in the case of electronic records, electronic or magnetic sources. Records are maintained or transferred according to the client's instructions in the event the laboratory transfers ownership.

All documents (data and records pertaining to the laboratory and its' quality system, customers, personnel or business transactions) are maintained for a minimum of 7 years. Drinking water is held for 10 years. Prior to destruction, ODEQ drinking water compliance and bioassay customers are notified.

14.0 REVISIONS

The Regulatory Affairs Department has an electronic version of this Quality Assurance Manual with tracked changes detailing all revisions made to the previous version. This version is available upon request. Revisions to the previous version of this appendix are summarized in the table below.

Document	**Revision**
Quality Assurance Manual Version 15.0 (Appendix XIII)	Appendix origination – Incorporated necessary elements in previous stand-alone quality manual with effective date of 1/18/16 to produce this appendix.

End of Document

APPENDIX B

Relevant Standard Operating Procedures (SOPs) and Field Forms

SOP 1

Soil Sampling and Logging

Introduction
This SOP describes the procedures for properly collecting, handling, and logging soil samples (when required). Method-specific sampling techniques are presented in the following SOPs:

SOP 2	Surface Soil Sampling
SOP 4	Test Pit and Excavation Soil Sampling
SOP 5	Direct-push Drilling Sampling
SOP 13	Field Instrument Calibration
SOP 17	Equipment Decontamination
SOP 20	Sample Handling and Documentation
SOP 39	XRF Field Screening

Equipment

Equipment needs will vary, depending on the sample collection or drilling method. Refer to the appropriate SOP listed above for method-specific equipment needs.

Procedures

Non-Sleeved Grab Samples
Immediately upon receiving the sample, either from the split spoon or backhoe bucket, the material will be screened with the appropriate direct reading instrument, such as a PID or XRF, and the reading will be recorded on the log form or in the field notebook. The portion of the sample collected for chemical analysis will be transferred immediately into the appropriate sample container using decontaminated equipment, new wooden tongue depressors, or by hand wearing new disposable chemical-resistant gloves. Avoid gravels and rock fragments when filling soil sample containers. If the sample is to be analyzed for volatile organics, the container will be completely filled with soil to minimize headspace. The container will be labeled appropriately following SOP 20 and immediately stored in an iced cooler to maintain a temperature of 4° Celsius.

Grab Samples Using Sleeves (auger drilling methodology)
When sampling for volatile compounds, the sample will be kept in the brass or plastic sleeves, and the sleeves will be handled with chemical-resistant gloves. The sample will be screened with the direct reading instrument by exposing the end of one sample tube to the instrument probe. The sample sleeve selected for chemical analysis will be packaged immediately by covering each end of the sleeve with Teflon™ tape and sealed with plastic caps. The sample sleeve will be labeled as described above and immediately stored in an iced cooler to maintain a temperature of 4° Celsius.

Grab Samples Using Sleeves (Direct-push drilling methodology)
The sample sleeve will be cut and the sleeves will be handled with chemical-resistant gloves. The sample will be screened with the direct reading instrument by removing a portion of the sleeve, exposing the soil to the instrument probe. The soil sample selected for

chemical analysis will be packaged immediately into laboratory-supplied soil jars, labeled as described above, and immediately stored in an iced cooler to maintain a temperature of 4° Celsius.

Composite Soil Samples

Composite samples will be prepared by placing equal amounts of soil in a stainless steel bowl or a clean plastic bag using a stainless steel spoon or by hand wearing new chemical-resistant gloves. The sample will be homogenized with a stainless steel spoon or gloved hand. The homogenized soil will be packaged in a laboratory-supplied sample container, labeled appropriately, and placed in an iced cooler to maintain a temperature of 4° Celsius.

Soil Logging

When a detailed log of soils is required by the Sampling and Analysis Plan, soil will be logged following the procedures outlined below. The level of detail for soil logging will depend on the Data Quality Objectives and intended use of the log information. A description of visual soil characteristics will be recorded for all soil samples. The soil description may include the following information (in the order listed below):

- Soil type according to unified soil classification system
- Color according to the Munsell color chart
- Grain size and roundness
- Percentage fines, sands, and gravels
- Presence of interbedding, and number and thickness of layers
- Description of odors, staining, or sheen
- Density or stiffness
- Relative moisture content

A description of soil types and various field tests for soil classification is given at the end of this SOP.

The following information will be recorded in the appropriate spaces provided on the sample log form:

- Depth of all drive samples;
- Sample interval submitted for laboratory analysis;
- Meter reading from direct-reading instrument (if applicable);
- Contacts between soil types.

In addition to logging soils, the geologist will record the occurrence of first water and the approximate static water level within each borehole. The reference point for all subsurface measurements will be included on all boring logs (i.e., feet below ground surface).

Decontamination

Strict decontamination procedures, as outlined in SOP 17, will be used to prevent cross-contamination of samples. Decontamination will be performed on non-disposable sampling equipment, including drilling equipment (e.g., auger barrel, split spoon) and hand tools (e.g., shovels, hand augers, etc.

When possible, samples will be collected using disposable equipment to avoid the need for decontamination.

Unified Soil Classification System (when required)

The following is an overview of classifying soil according to the USC system. The distinction between soil types is based on the percentage of fine vs. coarse material in a sample. This is easily done in a laboratory but involves a lot of guesswork in the field. The key is to be consistent. If you are fortunate enough to have samples submitted to a geotechnical lab for sieve analysis, check your field classifications against the laboratory results. This will help you estimate percentages in the field.

1) Distinguishing Coarse-grained from Fine-grained Soils:
   A) Determine if material is predominantly coarse grained (sand or gravel) or fine grained (silt or clay). Coarse-grained materials are those with more than 50% retained on a No. 200 sieve (very fine-grained sand or larger).

   B) If coarse-grained, determine if it is predominantly sand or gravel. Be aware that in the USCS system, pea gravel-size particles are considered "very coarse grained sand."

   C) Further classify material based on the amount of fines present. Roughly, no or very little fines is a SP or GP classification; slight amount of fines is a GP-GM or a SP-SM classification; much fines is a GM or SM classification. The following chart shows the breakdown for these classifications.

Classification of Coarse-grained Sands
>50% larger than No. 200 sieve

Percentage Fines	Soil Name	USC Designation
<5% Fines	Gravel	GP or GW[1]
	Sand	SP or SW[1]
5-12% Fines	Gravel with Silt or Clay	GP-GM or GP-GC
	Sand with Silt or Clay	SP-SM or SP-SC
>12%	Silty or Clayey Gravel	GM or GC
	Silty or Clayey Sand	SM or SC

[1] - The designation SW or GW means well sorted -not well graded (confusing for geologists). This is a condition not normally found in natural depositional environments and usually indicates engineered fill. Do not use this classification unless you think the material is specifically graded-engineered fill.

   D) If material is fine grained, determine if any coarse-grained materials are present. Note that all fine-grained materials have the same USC designation. Therefore, you must use both the name and the designation to adequately describe the soil. Use the following chart to classify fine-grained materials.

Classification of Fine-grained Soils
>50% passing No. 200 sieve

Percentage Coarse	Soil Name	USC Designation
<15% Coarse	Silt	ML, MH
	Clay	CL, CH
15-29% Coarse	Silt w/Coarse	ML, MH
	Clay w/Coarse	CL, CH
>29% Coarse	Sandy Silt	ML, MH
	Gravelly Silt	ML, MH
	Sandy Clay	CL, CH
	Gravelly Clay	CL, CH

2) Classification of Fine-grained Soils

A) Distinguish clay from silt. The following are field tests for determining if a material is clay or silt.

1) Dilatency (reaction to shaking)
Remove course-grained materials. Prepare a pat of moist soil with a volume of about 1/2 cubic inch. Add enough water if necessary to make the soil soft but not sticky. Place the pat in the open palm of one hand and shake horizontally, striking vigorously against the other hand several times. A clean fine-grained sand will rapidly show water on the surface and become glossy. When squeezed between fingers, the gloss disappears from the surface, the pat stiffens and finally cracks or crumbles. A very plastic clay will show little reaction to shaking and squeezing; an inorganic silt will react somewhere in between.

2) Dry strength (crushing characteristics)
After removing coarse-grained particles, mold a pat of soil to a 1/2-inch cube, adding water, if necessary. Allow to dry completely. Test the strength of the dry cube by crushing between fingers. The dry strength increases with increasing plasticity, with a plastic clay having high dry strength. An inorganic silt and silty fine-grained sands are similar. Fine sand feels gritty where silt has a smooth, flour-like feel.

3) Toughness (consistency near plastic limit)
The worm test: roll soil into a rope (or worm). A clay can usually be rolled to 1/8-inch diameter before it breaks.

B) CH vs. CL and MH vs. ML

C) Additional Characteristics

1) Relative Density (coarse-grained material)

Blows per foot	Relative Density
<4	very loose
4 - 10	loose
10 - 30	medium dense
30 - 50	dense
> 50	very dense

2) Consistency (fine-grained material)

Blows per foot	Consistency	Field Test
0 - 2	very soft	easily penetrated several inches with fist
2 - 4	soft	easily penetrated several inches with thumb
4 - 8	medium stiff	penetrated several inches by thumb with moderate effort
8 - 15	stiff	readily indented by thumb but penetrated only with great effort
15 - 30	very stiff	readily indented by thumbnail
> 30	hard	indented with difficulty by thumb nail

3) Relative Moisture

Moisture is measured relative to its optimum water content for compaction. Use the following descriptions:

Relative Moisture	Field Test
Dry	does not contain water.
Slightly Moist	damp, will not hold together.
Moist	soil will reach its maximum compaction under pressure.
Wet	contains excess moisture for compaction.
Saturated	below the water table.

SOP 2

Surface Soil Sampling

Introduction

This SOP describes the procedures for sampling surface soils from ground surface to 12 inches below ground surface. Samples may be collected with decontaminated hand tools.

Equipment

- Hand tools (e.g., shovels, spoons, etc.)
- Sample driver apparatus
  - Drive barrel
  - Brass sleeves
  - Rod and slide hammer
- Teflon™ tape and end caps to seal brass sleeves
- Laboratory-supplied sample containers if not using brass sleeves
- Decontamination Supplies
  - Buckets
  - Alconox Detergent
  - Distilled water
  - Scrub brush
- Direct Reading Instrument (PID and/or XRF)
- Tape Measure
- Log Forms/Field Notebook

Preliminaries

Soil sample locations will be determined from the project-specific work plan. If necessary, concrete coring will be arranged before mobilizing to the field.

Procedures

Soil will be collected and placed into laboratory-supplied sample containers with decontaminated hand tools or with a gloved hand. Coarse-grained soils, such as gravel and rock fragments, will be avoided whenever possible. To prevent loss of volatiles, soil will be packed tightly inside the sample container to minimize headspace.

If soil samples are being collected with a sample driver, brass sleeves will be placed inside the sample barrel and the sampler will be driven to the desired depth with the slide hammer. After the sample barrel is retrieved, the brass sleeves will be removed and the ends of each sleeve will be covered with Teflon™ tape and sealed with plastic caps.

Samples will be labeled appropriately and immediately stored in an iced cooler to maintain a temperature of 4° Celsius. The sample depths and locations will be measured and documented in the field notebook with the soil description.

SOP 4

Test Pit/Excavation Soil Sampling

Introduction

This SOP describes the equipment and procedures for collecting soil samples from test pits and excavations. Samples may be collected from the backhoe bucket or from the excavation wall, provided the excavation meets safe entry requirements.

Equipment

- Hand tools (e.g., shovels, spoons, etc.)
- Sample containers
- Decontamination supplies
  - Buckets
  - Alconox detergent
  - Distilled water
  - Scrub brush
- Direct reading instrument
- Tape measure
- Log forms/field notebook
- Laboratory-supplied sample containers

Preliminaries

Sample locations will be determined using the project-specific work plan. Arrangements will be made for the location of underground utilities using Blue Stakes. When necessary, a private locating service will be used for utilities that are not covered by Blue Stakes.

Procedures for Sampling from Backhoe Bucket

Soil within the backhoe bucket will be screened with the appropriate direct reading instrument and readings will be recorded in the field notebook. Soil samples selected for laboratory analysis will be collected from the backhoe bucket, taking care to avoid sloughed material and avoiding material that has been in direct contact with the backhoe bucket. Samples will be packed in laboratory-supplied containers to minimize headspace. Each sample will be labeled following SOP 20.

Procedures for Sampling Directly from Pit Wall (less than 5 feet deep)

A fresh surface will be scraped from the pit wall using decontaminated hand tools. The soil on the pit wall will be screened with a direct reading instrument and the reading will be recorded in the field notebook. A soil sample will be collected by either pushing a brass sleeve into the wall of the excavation, or by removing material with decontaminated hand tools or gloved hand and packing it into the sample container. To prevent loss of volatiles, the brass sleeve or sample jar should be packed full so that no headspace is present. Each sample will be labeled following SOP 20.

Decontamination

Strict decontamination procedures, as outlined in SOP 17, will be used to prevent cross-contamination of samples. Decontamination will be performed on non-disposable sampling equipment, including drilling equipment (e.g., auger barrel, split spoon) and hand tools (e.g., shovels, hand augers, etc.

SOP 5

Direct-push Drilling Sampling

Introduction

Direct-push drilling equipment will be used to advance shallow soil borings (generally 30 feet or less) to collect soil and groundwater samples and for sites where access restrictions prevent mobilization of a larger drill rig. Standard operating procedures for direct-push soil and groundwater sampling are described below.

Preliminaries

Direct-push drilling sample locations will be marked or staked in the field and coordinated with the Terracon project manager and, if necessary, the client's project manager. Blue Stakes utility clearance will be requested for each boring location prior to direct-push sampling. Borings will be located at least two feet from marked underground utilities.

All sampling equipment will be decontaminated according to SOP 17 prior to initiating drilling activities. This equipment includes all direct-push drill rods, samplers, and hand tools.

Direct-push Drilling Equipment and Procedures

Soil borings will be advanced and sampled using a hydraulic hammer mounted to a truck, van, three-wheeler, or small tractor. Each borehole will be started by hydraulically hammering steel drill rod with a disposable pointed steel end point into the ground. The borehole will be advanced in regular increments, available in varying lengths from 2 to 5-feet, by adding sections of flush-threaded drill rod to the drill stem already in the ground. No lubricants or additives will be used while advancing direct-push borings.

Soil Sampling Equipment

The following equipment will used to conduct soil sampling:

- Direct-push core samplers (supplied by the drilling contractor)
- New polybuterate sample liners (supplied by the drilling contractor)
- New sample liner end caps (supplied by the drilling contractor)
- Chemical-resistant gloves
- Appropriate personal protection equipment according to the HASP
- Sealable plastic bags
- Sample labels
- Laboratory-supplied glass soil sample jars and labels (optional)
- Stainless steel putty knife
- Stainless steel bowl and spoon
- Photoionization detector (PID)
- Cooler and ice
- Munsell color chart, if required
- Unified Soil Classification System (USCS) chart, if required

Soil Sampling

Samples will be collected as specified in the site-specific sampling plan. At a minimum, soil samples will be collected at regular intervals if lithologic information is needed. Each soil sample will be collected in a drill rod sampler lined with a clear polybuterate sample sleeve. The sampler will be attached to the drill rod, lowered to the sample interval, opened, and then hydraulically hammered into the subsurface.

Soil samples for laboratory analyses can be collected directly in the samples' sleeves or may be transferred from the sleeves to laboratory-supplied sample containers using decontaminated hand tools or by hand wearing new chemical-resistant gloves.

Soil Sampling Using the Driller's Sample Sleeves

The polybuterate sleeves may be used as sample containers, using the following procedure. After the sampler has been retrieved from the borehole, the sample shoe will be removed from the sampler and the soil contents will be sealed in a plastic bag for headspace analysis. If the sample shoe is empty, a small amount of soil will be removed from the portion of the liner immediately above the sample shoe. The soil will be allowed to equilibrate in the plastic bag for approximately 15 minutes. The headspace vapors inside the bag will be measured by pushing the PID tip through one side of the plastic bag into the headspace of the bag. The maximum PID reading over a 30-second interval will be recorded at the corresponding depth on the soil-boring log. Following headspace sample collection, soil will be removed from each end of the polybuterate liner for soil classification. If recovery is poor, the headspace sample will be used for soil classification after the headspace reading has been measured and recorded on the boring log. The polybuterate liner will be trimmed flush on each side to minimize headspace, and each end will be covered with Teflon tape. Each end of the liner will then be sealed tightly with polybuterate end caps. The sample will be labeled and immediately placed in an iced cooler to maintain a temperature of 4°C.

In general, the sample liner associated with the highest headspace reading will be submitted for VOC and semi-VOC analysis. If headspace readings are zero for all samples, odors, soil staining, and clay-rich (high sorption) lithology will be used as selection criteria.

Soil Sampling Using Laboratory-Supplied Soil Jars

The sample sleeve will be cut and the sleeves will be handled with chemical-resistant gloves. The sample will be screened with the direct reading instrument by removing a portion of the sleeve, exposing the soil to the instrument probe. The soil sample selected for chemical analysis will be packaged immediately into laboratory-supplied soil jars, labeled as described above, and immediately stored in an iced cooler to maintain a temperature of 4° Celsius.

Sample Selection Criteria for Laboratory Analysis

In general, the sample liner associated with the highest headspace reading will be submitted for VOC and semi-VOC analysis. If headspace readings are zero for all samples, odors, soil staining, and clay-rich (high sorption) lithology will be used as selection criteria.

Groundwater Sampling

To facilitate the collection of groundwater samples at sites where the water table is penetrated, a temporary well point will be installed in the direct-push borehole. After the water table has been encountered, the borehole will be advanced at least three more feet to ensure adequate sample volume. The well point may consist of either a three-foot long stainless steel screen drill rod attachment or slotted PVC screened in a similar interval. New tubing and well screens will be used for each well point. A peristaltic pump will be attached to the tubing to obtain groundwater samples by the following analyte order in the appropriate laboratory-supplied pre-preserved sample containers:

1) VOCs and BTEXN
2) Semi-VOCs
3) Total Petroleum Hydrocarbons
4) Oil and Grease
5) Filtered metals

Groundwater samples collected for dissolved metals analysis may be field filtered using in-line filters attached to the outlet tubing of the peristaltic pump or with Nalgene™ hand-pump filters.

The sample will be labeled and immediately placed in an iced cooler to maintain a temperature of 4°C.

Boring Abandonment

After all soil and groundwater samples have been collected, each soil boring will be backfilled with granular bentonite. Borings that were drilled through asphalt or concrete will be backfilled with granular bentonite to within six inches of the ground surface and the asphalt and concrete cores will be restored.

Demobilization

After the equipment has been rigged down and loaded, the site will be cleaned and restored as close to its original condition as possible. All sampling equipment will be decontaminated prior to mobilizing to the next direct-push drilling sample location.

SOP 10B

Monitoring Well Design and Installation (using direct-push drilling)

Introduction

This SOP describes procedures for the drilling and installation of shallow monitoring wells within the unconfined water table aquifer using direct-push drilling equipment. Site-specific conditions may warrant deviating from these standard designs. Field personnel should consult with the project manager and the work plan before deviating from the basic design.

Well Design

The typical well design to be used is intended to provide water samples of the upper 5-10 feet of the water-bearing zone. The well screens will be 10-feet long and will be set so that the top of the screen is at least two feet above the highest-observed water level.

Casing and Screen Materials

In general, well materials will be 1-inch to 2-inch-diameter, schedule 40, flush-threaded, PVC. All joints will be flush-threaded. The perforated zone will be constructed from machine slotted 0.010-inch or 0.020-inch slot screen. A six-inch long sump (silt trap) will be placed at the bottom of the screen. Depending on site conditions, well materials can vary, including different diameter casings, different schedule ratings for the PVC, etc.

Sand Pack

The sand pack material will be a commercially packaged, inert, non-carbonate, well rounded, sieved, product of clean, silica sand. In general, a sand of 16-40 to 10-20 mesh should be used with 0.020-inch slot well screen. The sand pack will be placed from the bottom of the boring up to 1 foot above the top of the screened section.

Bentonite Seal

A bentonite seal will be installed in the annulus above the sand pack to prevent grout from infiltrating into the screen and sand pack zone. Bentonite chips may be used for the seal if it is placed above the water table. Pellets should be used below the water table, as they have a higher density than the chips and will settle through the water better.

Annular Seal

Shallow wells (less than 20 feet of annulus above the bentonite seal) can be sealed with bentonite chips, which are hydrated in place with potable water. Wells that have a longer annular space should be sealed with a cement grout mix.

Drilling and Installation Methods

Drilling Equipment

Boreholes for monitoring wells will be installed using direct-push drilling equipment unless field conditions dictate otherwise. The inside diameter of the rods should be at least 1 inch larger than the outside diameter of the well casing to allow room for a filter pack and grout seal to be installed through the rods.

Borehole Drilling

The borehole for the well casing will be drilled using direct-push rods. No lubricants, circulating fluid, drilling muds, or other additives will be used during drilling.

During drilling, native soil samples will be retrieved in clear polybuterate sleeves within the direct-push rods. The collected samples will be logged per the sampling work plan requirements, which may include soil type (Unified Soil Classification), moisture, and color. Selected samples may be submitted for chemical and physical analysis if called for in the work plan.

Once the borehole has been drilled to the desired depth, the subcontractor will prepare to install the well. The drill rods will remain in the ground to ensure stability of the borehole during well construction.

Well Casing Installation

Clean chemical-resistant gloves will be worn by drilling personnel while handling the well screen and casing. All lengths of well casing and screen will be measured and recorded in the field log book prior to well installation.

Filter Pack Installation

The filter sand pack will be installed by slowly pouring silica sand through the direct-push rods as they are slowly removed from the borehole. By this procedure, the rods act as a tremie pipe and will prevent sand from bridging inside the rods. The level of sand pack inside the annular space will be continuously monitored. As the rods are pulled upward, the sand settles out through the bottom and additional sand pack will be added at the surface. By adding sand pack this way, the borehole will remain open and free from cave-ins, and the well casing will remain centered within the sand pack and the borehole.

Bentonite Seal Installation

After the appropriate amount of sand pack has been added and its depth verified, the remaining annulus will be sealed with bentonite. Once the desired thickness of bentonite is in place, the bentonite will be allowed to settle for approximately 30 minutes. The thickness of the bentonite seal will be verified and subsequently hydrated using potable water.

Flush-Mount Completion

After the grout has cured, the PVC well casing will be cut so that it is approximately three inches below the ground surface. The top of the PVC well casing will be sealed with a locking expandable well cap, or PVC cap, and an 8-inch flush-mount well vault will be installed at the surface with cement. The cement surface surrounding the vault cover will be slightly mounded to cause surface water to drain away from the well so that the well vault will not fill with water.

SOP 12

Groundwater Monitoring Well Sampling

Introduction

This SOP describes the equipment, criteria, and procedures that will be used to sample groundwater monitoring wells. Some deviations from this SOP may be necessary because of site-specific conditions.

Equipment

Below is a checklist of equipment for conducting groundwater sampling:

- Tools for opening well covers
- Keys to wells
- Water-level indicators
  - Dual-phase (if free product is suspected)
  - Single phase
- Positive displacement pump
- pH, conductivity, and temperature meters
- Standards for pH calibration
- In-line filters for metals samples
- Chemical resistant gloves
- Laboratory-supplied sample containers
- Iced cooler
- Field Notebook
- Chain of custody form
- Appropriate personal protection equipment according to HASP
- Photoionization detector (optional)
- Drum(s) for purge water containment
- Drum labels
- Permanent marker

Preliminaries

All equipment will be decontaminated as described in SOP 17 prior to initiating sampling. Equipment requiring calibration will be calibrated following manufacturer's recommendations prior to initiating sampling. If a well pump will be used, the operating condition of well pump will be checked prior to field mobilization.

Procedures

Upon arriving at each groundwater monitoring well, the well vault cover will be removed and the wellhead will be examined. Any signs of tampering will be recorded in the field logbook. The lock and well cap will then be removed from the well casing and depth to water and total depth will be measured.

Well Evacuation

To obtain a groundwater sample representative of natural aquifer conditions, at least three casing volumes will be evacuated from the well using a positive displacement pump, disposable bailer, peristaltic pump with new tubing, or other equipment per the sampling work plan. Non-disposable equipment will be decontaminated prior to use as described in SOP 17. Evacuated groundwater will be poured into a graduated 5-gallon bucket to keep track of the purge volume. If purge water cannot be discharged at the site, when the graduated bucket is full, the contents will be transferred into a 55-gallon drum. If the well does not recharge fast enough to permit the removal of three casing volumes, the well will be pumped dry and sampled as soon as it has sufficiently recharged.

Casing Volume Calculation

The well casing volume will be calculated to determine the purge volume required to obtain a groundwater sample representative of natural aquifer conditions. The following procedure will be used to calculate the total purge volume. Using the top of the north side of the inner well casing as a reference point, the depth to water (DTW) and total depth (TD) of the well will be measured using a water-level probe. The height of the water column will then be calculated by subtracting the depth to water from the total depth of the well (TD - DTW). Equation (1) below is used to calculate volume constants for wells with various casing sizes.

$$\text{Well Casing Volume} = \pi (\text{Casing Radius})^2 (7.48 \text{ gal/ft}^3) \quad (1)$$

where Casing Radius = the radius of the well casing in feet
7.48 gal/ft^3 = volume conversion constant
π = constant = 3.14

For a 2-inch diameter well casing: Casing Volume = (TD-DTW feet) (0.16 gallons/foot)
Total Purge Volume = Casing Volume x 3

For a 4-inch diameter well casing: Casing Volume = (TD-DTW feet) (0.65 gallons/foot)
Total Purge Volume = Casing Volume x 3

Stabilization Parameters

If required by the sampling work plan, groundwater stabilization parameters pH, temperature, and specific conductivity can be monitored during well purging to verify when the aquifer has stabilized and groundwater sampling can commence. Stabilization parameters will be measured at least four times; once every casing volume and immediately before sampling. All stabilization parameter measurements will be recorded in the field log book. The following guidelines are acceptable ranges for stabilization parameters:

- pH readings are consistently within 0.2 pH units;
- temperature is within 0.5˚C of the last reading;
- conductivity is within 10 percent of the last reading.

Groundwater Sample Collection

A complete set of laboratory-supplied sample containers will be prepared and labeled prior to collecting groundwater samples. A disposable bailer or low-flow peristaltic pump will be used to obtain groundwater samples by the following analyte order in the appropriate pre-preserved sample containers:

1) VOCs including BTEXN;
2) Semi-VOCs;
3) Total Petroleum Hydrocarbons;
4) Oil and Grease/TRPH;
5) Filtered metals.

All 40-milliliter containers will be filled so that no headspace is present in the container after the lid has been fastened. Groundwater samples collected for dissolved metals analysis may be field filtered using inline filters attached to the outlet tubing of a peristaltic pump or with a Nalgene™ hand-pump filter press. The labels for each groundwater sample will be double-checked and immediately placed in an iced cooler to maintain a temperature of 4˚C.

Purge Water Containment and Disposal

If required by the sampling work plan, purge water can be contained in labeled 55-gallon drums and stored onsite. At a minimum, drum labels will contain the following information:

- Site Identification
- Monitoring Well Identification
- Volume (Gallons) of Purge Water
- Terracon
- Terracon Project Manager (Name)
  6949 South High Tech Drive
  Midvale, UT 84047
  801-545-8500

The final disposition of the purge water will depend on groundwater analytical results and contract specifications.

Decontamination

All sampling equipment will be decontaminated according to SOP 17 before initiating sampling. If more than one well will be sampled, sampling equipment must also be decontaminated between wells.

Demobilization

After well sampling has been completed and all equipment has been decontaminated, each well will be capped and secured. Damaged equipment will be noted in the field logbook and labeled on the instrument.

SOP 13

Field Instrument Calibration

Introduction

This SOP describes the procedures for the use and calibration of the most commonly used field instruments. The use and calibration procedures are provided for the following field instruments:

- Photoionization detector/organic vapor monitor (PID/OVM)
- X-Ray Fluorescence (XRF) Multi-element Analyzer

Photoionization Detector

- Photoionization detector meter and filter screen
- Isobutylene span gas (100 ppm) and gas sample bag

Calibration Procedures

Calibration procedures will be performed, as specified by the manufacturer, each day prior to use.

X-Ray Fluorescence (XRF) Multi-element Analyzer

- XRF

Calibration Procedures

Calibration procedures will be performed, as specified by the manufacturer, each day prior to use. When the sampling work plan requires EPA Method 6200 sampling methods, the calibration requirement listed in EPA Method 6200 will be followed.

SOP 17

Equipment Decontamination

In order to reduce the risk of cross-contamination or transferring contaminants from areas of known contamination to known clean areas, decontamination of personnel and equipment is required. The decontamination procedures shall be established for each site based on the degree of hazard associated with the site and the amount of contact with hazardous materials resulting from site work. Final decontamination procedures shall be reviewed and approved by the Site Safety and Health Manager and included in the site-specific Health and Safety Plan (HASP). This procedure contains general decontamination protocols, suitable for most sites, although decontamination procedures will be reviewed on a site-by-site, contaminant-by-contaminant basis. Spent decontamination fluids will generally be considered non-hazardous waste and disposed accordingly, dependent on contaminant types present at a given site.

Decontamination Guidelines

Terracon uses a four-step decontamination procedure described below:

Step 1 Gross Contaminant Removal
This step consists of a removing gross materials by gloved hand and then scrubbing using a detergent solution and water and a stiff brush. Scrubbing will continue until visible contaminants are removed. The water will be changed as necessary, daily at a minimum.

Step 2 Alconox Wash
An Alconox wash will be prepared by mixing 1 to 1-½ tablespoons of Alconox per gallon of warm water. The water will be changed as necessary, daily at a minimum.

Step 3 Clear Water Rinse
A rinse with clear potable water. This water will be changed as necessary to ensure its purity, daily at a minimum.

Step 4 Distilled Water Rinse
Unused distilled water will be used as a final rinse for all decontamination procedures. The water may be poured or sprayed.

Decontamination Blanks to document the decontamination procedures will be collected if required in the sampling work plan.

SOP 20

Sample Handling and Documentation

Introduction

This SOP describes procedures to follow once soil, sediment, or water samples are collected to ensure that the samples are handled properly and that appropriate documentation is completed.

Sample Handling

Chemical resistant gloves will be worn during collection and initial handling of all samples. All samples will be promptly placed in an iced cooler to maintain a temperature of 4°C. Typically, samples selected for chemical analysis are delivered at the end of each day to the analytical laboratory. If they are not submitted to the laboratory on the same day collected, they will be stored in a refrigerator in a locked sample storage room at Terracon's office until transport and delivery to the laboratory in an iced cooler. Upon receipt of the samples, the laboratory will record the internal temperature of the sample transport coolers on the chain of custody record.

Documentation

Sample Identification and Labeling

Samples will be labeled following the specific labeling requirements set forth in the sampling plan or using labeling methods that identify the area from which they were collected and the depth.

Each sample sleeve or sample container will be immediately labeled with the following information:

- Project number
- Sample identification
- Sample depth
- Date and time collected
- Analyses requested
- Filtered or unfiltered (for water samples)

This information will also be recorded in the field notebook. An example sample label is provided as an attachment to this SOP

Chain of Custody

Chain of custody documentation will begin in the field for each sample submitted to the laboratory and will be maintained by laboratory personnel. Samples will remain in the possession of the sampler at all times, or in a locked facility until delivery to the analytical laboratory. A chain of custody form will be completed and will accompany each sample cooler to the analytical laboratory. An example chain of custody form is provided as an attachment to this SOP.

Field Book

Terracon field personnel will maintain a field log book to record all field activities. The field logbook will be a weather-resistant bound survey-type field book. All data generated during the project and any comments or other notes will be entered directly into the field logbook.

Example Sample Label:

Prepared by Environmental Science Corp

Project: _____

Proj #: _____

Sample Location/ID: _____

Analysis Reqd: _____

_____

Date: _____ Time: _____

Example Chain of Custody Form:

Company Name/Address:
Terracon - Draper

640 E Wilmington Avenue
Salt Lake City,UT 84106

Billing Information:

Accounts Payable
640 E Wilmington Avenue

Salt Lake City,UT 84106

Analysis/Container/Preservative

Chain of Custody
Page ___ of ___

ESC LABORATORIES
12065 Lebanon Road
Mt. Juliet, TN 37122

Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859

Report to:

Email to:

Project Description:

City/State Collected

Phone:
FAX:

Client Project #:

ESC Key:

Collected by: (print)

Site/Facility ID#:

P.O.#:

Collected by (signature):

Immediately Packed on Ice N ___ Y

Rush? (Lab MUST Be Notified)
___ Same Day.....200%
___ Next Day.....100%
___ Two Day.....50%
___ Three Day.....25%

Date Results Needed:

Email? __No __Yes

FAX? __No __Yes

No. of Cntrs

CoCode **TERRDUT** (lab use only)

Template/Prelogin

Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	Remarks/Contaminant	Sample # (lab only)

EXAMPLE CHAIN OF CUSTODY FORM

*Matrix: **SS** - Soil/Solid **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____	Condition: (lab use only)	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp:	Bottles Received:	CoC Seals Intact ___ Y ___ N ___ NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date:	Time:	pH Checked: NCF:

SOP 39

X-Ray Fluorescence (XRF) Field Screening

Introduction

This SOP describes one procedure used for screening soils or sediments for metals. Samples may be collected with a decontaminated hand tools, drive barrel, or gloved hand.

Equipment

- X-Ray Fluorescence (XRF) multi-element analyzer
- Resealable plastic bags
- Log Forms/Field Notebook

Preliminaries

Soil sample locations will be determined from the project-specific work plan. The XRF will be calibrated following SOP 13 prior to initiating sampling activities.

Procedures

In-Situ Screening Procedure

Secure faceplate to the XRF. Set on the ground at a 30 to 60 degree angle. Pull trigger until XRF beeps. XRF will be set to analyze for a pre-set amount of time. To change length of analysis time, see manufacturer's instructions. The amount of time the XRF requires to analyze the sample will vary, depending on the current age of the source.

Ex-Situ Screening Procedure

Soils or sediments to be screened ex-situ will be collected in new, thin, resealable plastic bags (do not use freezer bags or thick plastic bags) labeled with the sample name, date and time of collection, Terracon's project number, and the sampler's initials. Sufficient soils or sediments to fill approximately one-third to one-half of a gallon bag will be collected from each location. New latex or nitrile sampling gloves will be worn for each sample during collection and handling. The soils or sediments will be homogenized inside the bag by gloved hand, so that the XRF analyses represent the average concentrations of metals in the sample.

Once homogenized, the XRF will be used to screen the sample either through manufacturer-supplied thin plastic sample bags or using manufacturer-supplied sample cups.

- **manufacturer-supplied plastic bag:** Fill three new sample bags from the resealable homogenized bag. Remove the foam cup holder from the XRF sample tray and slide one of the sample bags into place. Set the XRF into the stand and depress the main trigger. After the pre-set sampling time, the XRF will beep and display the reading. Repeat with each of the three sample bags. The average of the three final readings will be used as the representative concentration. An alternative to using the manufacturer-supplied sample bags is to place the XRF directly on the homogenized resealable bag in three separate locations and take the readings directly.

- **manufacturer-supplied sample cup:** Prepare a sample cup by placing the bottom cap (cap with two or three holes) under the cylinder, then fill the cylinder with soil from the homogenized sample. Place the manufacturer-supplied plastic film tightly over the soil, and then place the top cap. Ensure that cap is placed tightly over sample. Place the sample cup in the manufacturer-provided tray and the XRF in the stand. Depress the main trigger. After the pre-set sampling time, the XRF beep and will display the reading.

Ex-Situ Screening Procedure (EPA Method 6200)

When required by the sampling work plan, XRF screening procedures should follow *EPA Method 6200: Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*.

E.1805
FIELD MEASUREMENT – SURFACE ELEVATIONS

Last Review or Revision: June 2010

Objective

The purpose of this procedure is to establish proper and accurate methods to be used when surveying elevations on environmental sites.

Background

On many environmental sites, the horizontal spacing of monitoring wells may be less than 100 feet. The hydraulic gradient between these wells may be less than 0.1 feet, which necessitates an accurate survey of the top of casing elevations to 0.01 feet. Inaccurate elevations in some cases could result in an inaccurate determination of groundwater flow direction.

Procedures

a) In performing an elevation survey of a site, the first task is to choose a benchmark (BM). The BM should be of a permanent nature, that will exist over time and will not change in elevation. When using a fire hydrant as a BM, do not use the operating plug or adjustment nut. The elevation on the operating plug can change after the fire hydrant is used. Poured-in-place concrete, sign foundations and hydrants will make a good BM. Attempt to identify a BM with a known elevation to USGS or another datum.

b) When setting up the level, the instrument person should first ensure that the tripod legs are stabilized and then the instrument can be leveled using the leveling screws. Instruments which are leveled using a bar level need to be turned at right angles and re-leveled until the instrument indicates level in all directions without adjustment. Instruments with a bull's eye level ordinarily need to be leveled once, but the instrument should be turned 360° to ensure that it is accurately leveled.

c) When using the level, the instrument person should be able to accurately read the rod to 0.01 feet. This entails limiting the distance of the shot so that this accuracy can be maintained. Windy conditions will affect accuracy, especially on shots made where the rod is extended beyond 15 feet in the air. If the instrument person has difficulty reading the rod due to the wind blowing and bending the rod, or because the rod person has difficulty holding the rod in a stable position, the instrument person has the responsibility of resetting to ensure an accurate shot.

d) Finally, the instrument person should perform a closed loop, utilizing balanced backsight and foresight distances. This requires shooting back to the point of beginning, usually the BM. Upon completion of the loop, the instrument person is responsible for immediately calculating the closure error. On a small site with no turning points, this consists of resetting the instrument, thus creating a turning point

and a loop. In these situations, the BM elevation should close with less than 0.01 foot difference. In situations where there are several turning points, the closure error should not be greater than 0.01 foot per 100 linear feet of surveyed distance.

Attached Supporting Documents

- Terracon Survey Notes Form

E.3000
BULK SAMPLING OF SUSPECT ASBSETOS-CONTAINING MATERIAL (ACM)

Last Review or Revision: June 2010

I. PURPOSE

The purpose of this standard operating procedure (SOP) is to provide information on the hazards of asbestos and procedures to follow to sample suspect materials for laboratory analysis. The following guidelines contained in this document apply to Terracon personnel who engage in bulk sampling of suspect ACM and are designed to provide standardization with respect to sample collection. This procedure should ensure that potential asbestos-containing material samples are collected in a manner which allows for accurate analysis of the material and that sampling personnel are protected against potential asbestos fiber releases through controlled sampling techniques or appropriate personal protective equipment.

The objective of bulk sampling building materials and components suspected to contain asbestos is to characterize the items that contain asbestos in quantities equal to or greater than 1% or other contaent limit as specified by local or state guidelines. By characterizing the locations and quantities of asbestos-containing materials (ACM), exposure hazards can be greatly reduced.

II. BACKGROUND AND REFERENCE

Asbestos has been a common component used in several building materials because of its strength enhancing and fire resisting properties. However, asbestos has been recognized as a human carcinogen and respiratory hazard. Due to its health hazards, building inspections and asbestos bulk sampling is requested for schools and many public or commercial properties prior to building renovation or demolition activities. Therefore, identifying, locating and quantifying materials containing asbestos is essential in the effort to prevent worker exposure to asbestos and prevent environmental contamination.

As a consequence of inhalation of asbestos fibers, a body of federal and state regulations has been developed. Federal regulations pertaining to asbestos are included in AHERA (Asbestos Hazard Emergency Response Act) US EPA 40 CFR 763, Subparts E, F; NESHAP (National Emissions Standards for Hazardous Air Pollutants (EPA 40 CFR 61); OSHA Asbestos Standards (29 CFR 1910.1001 and 29 CFR 1926.1101), and ASHARA (Asbestos School Hazard Abatement Reauthorization Act). Many states and local authorities have additional requirements including state-specific licensing and certification.

Terracon will comply with applicable federal, state and local regulations when conducting asbestos-related services.

III. EQUIPMENT

The minimum equipment necessary to conduct bulk sampling of suspect materials, in addition to the personal protective equipment outlined below in the Health and Safety Section, is listed below.

- Utility Knife, Chisel, Hammer, Screwdriver, Coring Tool
- Duct Tape
- Sample Containers (preferably ziplock-style clear plastic bags)
- Sample Labels and Indelible Marker
- Spray Atomizer containing Detergent Amended Water, Paper Towels/Wet Wipes
- Spray Adhesive
- Roof Patch Kit (if necessary)
- Measuring Wheel
- Camera
- Flashlight
- Field ACM Sample Log

IV. CERTIFICATION

Individuals conducting asbestos sampling must have the certifications listed below. Copies of these certifications and licenses should be taken to the site during the sampling event.

- United States Environmental Protection Agency Building Inspector training (and refresher training, if applicable)
- Asbestos Inspector State-license for the state of the project location (where necessary)

In addition, Terracon requires company-based training courses and hands-on experience of employees prior to commencing asbestos-related field services. Each employee must also receive respirator training, be medically monitored and successfully pass a fit-test utilizing issued respirator(s).

V. HEALTH AND SAFETY

Asbestos has been recognized to cause asbestosis, cancer of the lungs and digestive tract and mesothelioma. Asbestosis is a lung disorder characterized by a diffuse interstitial (between cell) fibrosis. The onset of asbestosis probably depends upon the asbestos dust

concentration, the morphology of the fiber and length of exposure. Cigarette smoking is strongly implicated as a co-carcinogenic among asbestos workers.

Under the OSHA asbestos standards, the employer has an obligation to protect employees against exposure to asbestos fibers in excess of 0.1 fibers per cubic centimeter of air (0.1f/cc). Personnel engaged in asbestos-related activities (including building inspections) must be trained, medically cleared and fit-tested for respiratory protection. Therefore, enrollment in a medical surveillance program in compliance with the OSHA asbestos and respiratory protection standards is mandatory. Terracon employees are not permitted to engage in asbestos-related activities unless they are enrolled in the Terracon medical surveillance program and have been medically cleared for respirator use by a physician.

The following safety and health protocols apply to Terracon personnel who engage in asbestos-related services. The guidelines contained in this document are based upon potential health hazards from exposure to asbestos fibers and physical hazards which may be encountered on survey project sites. Field activities will be performed in accordance with the procedures outlined in this document and applicable federal/state health and safety regulations.

Terracon personnel will use professional judgment during sample collection to prevent exposure to other building occupants. If unauthorized personnel attempt to enter a sampling area which could reasonably pose a fiber release hazard, the inspector will curtail bulk asbestos sample collection activity and request that the individual(s) leave the work area. If unauthorized personnel refuse to leave the work area, immediately contact the Project Safety Officer and/or a client representative. Sample collection activities should recommence only after unauthorized personnel have left the work area.

In the event that minor amounts of suspect asbestos containing materials such as thermal system insulation, sprayed-on or trowled-on surfacing materials, ceiling texture, etc. are released during the course of sampling, sampling team members will immediately evacuate the area and don Level C personal protective equipment. The area of potential ACM release will then be approached and suspect materials will be thoroughly wetted with amended water, slowly and deliberately swept to a centralized pile, re-wetted, and containerized in heavy mil asbestos disposal bags. Affected surfaces will then be re-wetted and swabbed with clean cloths or paper towels. Used wipes will be disposed of as asbestos-containing waste.

In the event that large quantities of potential ACM is released during sample collection activities, personnel will immediately evacuate the area and notify the Project Safety Officer and the client representative. The Project Safety Officer will request that the area be sealed until a properly attired response team can be mobilized to the area with a high efficiency particulate air filter (HEPA) vacuum and other equipment necessitated by site conditions.

If suspect materials are in deteriorated condition and fiber release appears likely, or if sampling must be conducted overhead and/or above drop ceilings, personnel will upgrade to Level C personal protective equipment as itemized above. Level C personal protective

equipment should be donned before moving drop ceiling panels, attic access panels, etc. where friable fireproofing or thermal system insulation are known to be present.

The indicated personal protective equipment shall be mobilized to asbestos sampling project sites on each day of sample collection and utilized, if necessary:

- Tyvek (standard) protective coveralls
- Half face or full face air purifying respirator equipped with HEPA (P-100) cartridges
- Impermeable gloves (nitrile or latex).
- Tyvek boot covers or washable outer footwear

Additional Health and Safety protocols such as those established by the owner/operator of the project site and Terracon's company policy regarding ladder safety, confined space entry and electrical hazards shall be followed.

VI. SAMPLING HAZARDS

a. Elevated Surfaces

Asbestos building inspections may include roofing materials and ceiling spaces containing suspect ACM. Appropriate ladders or other suitable devices (e.g., manlifts) will be used for gaining access to elevated sampling locations. Ladders will be inspected prior to use. Spreaders will be fully extended on all step ladders and firmly positioned prior to use. Where footing is uncertain, a sample team member will hold or otherwise secure ladders while in use by another sample team member. Personnel must always face ladders during both ascent and descent. Extension ladders will not be positioned more than one-quarter of their working length from buildings, walls, etc. (4:1 pitch). Sample team personnel will not walk on steeply pitched roof surfaces and will not walk on low pitched roofing surfaces while wet. Remain on designated roof walkways wherever present. Terracon personnel will visually inspect roofs prior to beginning sample collection activities and will avoid all areas which appear to be structurally unsound.

b. Confined Space Entry

Terracon asbestos inspectors will not enter any pit, shaft, tunnel, etc. which has limited means of egress, the potential for an oxygen deficient or toxic atmosphere or which was not designed for human occupancy without first developing a written safety plan which includes a confined space entry permit and procedures. Readily accessible spaces such as pipe tunnels in which personnel may stand can be entered to a distance where continuous visual and verbal communication can be maintained with another sample team member.

Adequate portable lighting must be utilized during sample collection in tunnels and similar spaces. No Terracon or sample team member may attempt to walk through a pipe tunnel,

etc. beyond the sight of a stand-by team member unless written confined space entry procedures have been prepared for the project.

c. Electrical Contact Hazards

Personnel will remain cognizant of the location and condition of electrical wiring during the collection of bulk asbestos samples. A visual assessment of each work space will be made prior to sample collection and electrical contact hazards will be evaluated. Unguarded junction boxes, exposed wiring, knife switches, etc. will be avoided during the collection of bulk ACM samples, and coring tools will not be used in near proximity to electrical switches or receptacles.

VII. PROCEDURES FOR BULK SAMPLING OF SUSPECT ACM

The primary purpose of this section is to identify the methods and techniques of controlled sampling, sampling site control and use of appropriate personal protective equipment to protect Terracon personnel and members of the general public from exposure to asbestos fibers during sampling activities. Adherence to these procedures should enhance personnel safety during sample collection activities and aid in the suitability of samples for analysis. Field activities will be performed in accordance with the procedures outlined in this document and applicable federal/state health and safety regulations.

Protocols for inspection and bulk sampling are defined in AHERA regulations. These are applicable for any type of survey; for example, a school, an area prior to renovation, a building prior to demolition and inspections undertaken to rebut the OSHA presumption that certain materials contain asbestos.

An accredited Building Inspector must perform the inspection. A summary of AHERA sampling protocols is as follows:

1. Visually inspect the building interior and/or exterior and identify locations of suspect ACM. Identify homogenous areas of friable and non-friable suspect ACM. Document locations, condition, classification and estimated quantities of each suspect material. It is recommended to depict locations of materials on a building diagram and take photographs of sampled materials.

2. Touch each suspect ACM to determine its friablity.

3. Collect representative samples of suspect ACM. Terracon recommends a minimum of three (3) samples of each material be collected from each homogeneous area. However, specific materials may require additional samples such as surfacing material and insulation

as described below. Judgment should be used on the need for and quantity of additional sample collection.

Surfacing materials: Collect, in a statistically random manner, at least 3 bulk samples from each homogenous area of 1,000 sq. ft. or less, at least 5 bulk samples from each homogenous area that is greater than 1,000 sq. ft. but less than or equal to 5,000 sq. ft., and at least 7 bulk samples of each homogenous area larger than 5,000 sq. ft.

Thermal System Insulation (TSI): Collect, in a randomly distributed manner, at least three bulk samples from each homogeneous area of TSI; collect at least one bulk sample from each homogeneous area of patched TSI if the patched section is less than 6 linear or square feet; collect bulk samples from each insulated mechanical system where cement or plaster is used on tees, elbows, etc. in a manner sufficient to assess whether the material is ACM.

If fiber release appears likely, wet methods will be employed in the collection of suspect ACM samples. Water amended with a minimum of 10% commercially available window cleaning solution or other suitable surfactant should be used to moisten materials prior to sampling. Bulk asbestos samples will not be collected over the heads of, or in near proximity to, non-project personnel. Respiratory protection is not required when sampling non-friable suspect materials or materials below the breathing zone which are adequately wetted with amended water.

4. Bulk ACM samples should be immediately placed in sample containers and sealed while the materials are wet. If collecting samples of friable ACM or normally non-friable materials which are in deteriorated condition, precautions must be taken to prevent the release of fibers to the work area. Precautions include aggressively wetting the surface or potentially isolating the material (e.g. glove bagging) prior to disturbance.

5. Reusable sampling equipment will be gently rinsed with amended water. Dry the equipment with paper towels to be disposed of as contaminated materials.

6. The following decontamination sequence should be used following sample collection activities requiring Level C personal protective equipment:

- Remove coveralls slowly turning the outside inward.
- Place in heavy mil asbestos disposal bag.
- Remove gloves and shoe covers (if utilized)
- Remove respirator and carefully dispose of respirator cartridges in asbestos disposal bag.
- Securely seal protective clothing and any potentially contaminated disposable sampling equipment in heavy mil asbestos disposal bags.
- Do not smoke or eat with soiled hands.

- Wash hands, face and forearms thoroughly before eating, drinking smoking or using toilet facilities.
- Shower thoroughly as soon as possible upon leaving the project site.

7. Bulk sample analysis for asbestos content is performed by polarized light microscopy (PLM). The analytical testing procedure is based on U.S. Environmental Protection Agency (EPA) methods and National Voluntary Laboratory Accreditation Program (NVLAP) requirements. Terracon will use NVLAP accredited and appropriately licensed laboratories for analysis of asbestos bulk samples. Samples will be controlled with the analytical laboratory through chain of custody documentation.

E.4000
SAMPLING OF POTENTIAL LEAD-BASED PAINT

Last Review or Revision: June 2010

I. PURPOSE

The purpose of this standard operating procedure (SOP) is to provide information on the hazards of lead-based paint (LBP) and describe procedures for identificationand proper LBP sampling techniques. The following procedures for sampling potential LBP using a direct reading instrument and paint chip collection are designed to provide standardization with respect to location and number of samples collected and method of labeling sample locations. In addition, this procedure should ensure that potential LBP samples are collected in a manner which allows for accurate analysis of the material. Finally, this procedure will help to ensure that sampling personnel are protected against potential lead dust releases through controlled sampling techniques or appropriate use of personal protective equipment.

The objective of sampling coated (i.e., painted, pigmented or stained) surfaces for LBP (LBP) is to characterize materials and components that contain lead in surface coatings and compare them to established limits such as the Environmental Protection Agency (EPA) or Housing Urban Development (HUD) standards and guidelines such as at quantities greater than 1.0 milligram per square centimeter (mg/cm^2) or 0.5% by weight or other regulated quantity as specified by state or local authority. By characterizing the locations and quantities of LBPs, exposure hazards can be greatly reduced.

II. BACKGROUND AND REFERENCE

Lead is a toxic heavy metal which may cause blood, kidney and nervous system disorders if inhaled or ingested. Metallic lead and lead contained in dusts are not readily absorbed through the skin. However, skin contact with potentially contaminated site materials should be avoided.

The United States EPA and HUD have established an action level for LBP of 1.0 milligram per square centimeter (mg/cm^2) or 0.5% by weight. Coatings with quantities equal to or greater than these values are considered LBP. The Occupational Safety and Health Administration (OSHA) does not establish a LBP quantity but regulates the amount of lead that can become airborne and either inhaled or ingested by setting limits for air concentrations of 0.05 milligram per cubic meter (mg/m^3) of air over a work shift and blood values of 50 micrograms per deciliter of blood.

Lead was a common ingredient in paint until 1978 when the Consumer Product Safety Commission (CPSC) banned the sale of LBP for use in residences in quantities greater than 0.06% by weight. However, some industrial paints still contain lead today and are used in several applications. Lead can be introduced into the air by sanding or abrading surfaces containing LBP, and inhalation or ingestion of the dust is possible. Ingestion of lead can occur when children consume deteriorated paint chips, children place exposed toys or body parts into their mouths or when industrial workers exposed to lead-containing dust eat or smoke without washing their hands.

The lead content of paint can be determined with direct-reading instrumentation or by analysis of a bulk paint chip sample. An X-ray fluorescence (XRF) type analyzer is recommended to obtain direct readouts of lead content in coated surfaces. The XRF analyzes for lead by atomic absorption spectroscopy (AAS). Results are in milligrams of lead per square centimeter. Paint chip sample analysis is performed by inductively coupled plasma-atomic emission spectrometry (ICP-AES) in accordance with EPA SW-846 Method 6010B. Results are typically reported as lead percent per paint chip weight.

When sampling for LBP in buildings classified under the United States Department of Housing and Urban Development (HUD) or other child occupied-facilities (i.e., publicly and privately owned-housing, public buildings, daycares, etc.), procedures stated in the most current revision of the Department of Housing and Urban Development *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards Housing*, June 1995 revision will be used.

Lead is also regulated by the Occupational Safety and Health Administration (OSHA) and the EPA. Occupational exposure to lead occurring in the course of construction work, including maintenance activities, painting, renovation and demolition, is subject to OSHA standard (29 CFR 1926.62), Lead Exposure in Construction. Construction work covered by 29 CFR 1926.62 includes any repair or renovation activities or other activities that disturb in-place, lead-containing materials. Employers must assure that no employee will be exposed to lead at concentrations greater than 0.05 mg/m^3 averaged over an eight-hour period without adequate protection.

The Resource Conservation and Recovery Act (RCRA) provides the EPA with the authority to regulate the waste status of demolition or renovation debris, including lead-containing materials. Specific notification and testing requirements must be addressed prior to transporting, treating, storing or disposing of hazardous wastes. Lead containing wastes are considered hazardous waste under RCRA if Toxicity Characteristic Leachate Procedure (TCLP) results exceed 5 milligrams per liter (mg/L). EPA exempts from most RCRA requirements those generators whose combined hazardous waste generation is less than 100 kilograms (kg) per month.

III. EQUIPMENT

LBP analysis can be conducted by using a direct reading XRF analyzer or by collecting paint chip samples. Equipment necessary to conduct both methods is listed below.

For direct reading sampling:

- X-ray fluorescence (XRF) analyzer and accessories
- XRF result field log (optional if downloading software is used)

For paint chip sampling:

- Heating tool and extension cord
- Tape measure or template
- Chisel
- Chipping hammer or scraper (lead paint samples from metal structures)
- Face shield or chipping goggles
- Sample containers (preferably sturdy, clear plastic vials)
- Sample labels
- Laboratory chain of custody for paint chip sample analysis

IV. CERTIFICATION

Individuals conducting LBP inspection services should have the certifications listed below. Copies of these certifications and licenses should be taken to the site.

- EPA lead inspector and risk assessor certification
- As applicable, local- or State-licensed lead inspector/risk assessor (required for HUD projects)
- Manufacturer training certification for the XRF analyzer

V. HEALTH AND SAFETY

The OSHA personal exposure limit (PEL) for lead is 0.05 milligram per cubic meter (mg/m^3) and the action level is 0.03 mg/m^3. The primary route of exposure of lead is through inhalation of contaminated dusts or by accidental ingestion; however, collection of small sample volumes required for analysis is not expected to generate significant dust. Although, if painted surfaces are being disturbed and dust is generated in the vicinity, personnel will take protective measures as indicated below. Project activities may be conducted in Level D personal protective equipment modified as specified below.

- Lead sampling activities will be performed in Level D personal protective equipment to include standard work uniform, safety footwear and hard hat if overhead hazards are present.

- Protective goggles or a full face shield will be worn during chipping hammer operations.
- Protective gloves should also be worn during lead chip sampling to prevent abrasion and contact with site materials. Half face disposable dust/fume/mist respirators (3M 9920 "surgical style" masks) or half-face air purifying respirators equipped with HEPA filter cartridges will be worn if dusty conditions develop on-site.

Due to the potential of accidental ingestion when working in areas with lead dust, do not smoke or eat with soiled hands. Wash thoroughly before eating, drinking or smoking. Shower thoroughly as soon as possible upon leaving the site.

The XRF analyzer contains a radioactive source and should be transported and used according to the manufacturer's instructions. Personnel utilizing the equipment shall have the proper training and certifications required for use of the equipment.

VI. PROCEDURES FOR XRF ANALYSIS

1. Identify areas with coated or prepared surfaces. This includes building materials, components and fixtures finished with a coating such as paint, stain and varnish. Wallpaper can mask prepared surfaces and should be included in the survey. Some ceramic tiles have a lead-containing glaze and should also be assessed, particularly where required by state or local regulatory agencies.

2. Select appropriate materials and locations to be sampled. When sampling painted interior surfaces, representative samples must be obtained per client instruction or in general compliance with the most current revision of the Department of Housing and Urban Development *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards Housing*, June 1995revision.

3. Calibrate the XRF unit according to the manufacturer's instructions before and after the survey. This involves taking calibration sample readings from a known source provided by the manufacturer.

4. Conduct XRF sampling on selected surfaces. Document descriptions of each surface sampled on the XRF result field log or using the manufacture's software. Record results on the XRF result field log if software is not used.

If results yield 1.0 mg/cm^2 (inconclusive), then a paint chip sample should be collected using the applicable procedures indicated in the following section.

If results indicate the presence of lead in quantities greater than 1.0 mg/cm^2, it is recommended that a photograph depicting the material and location be taken.

VII. PROCEDURES FOR PAINT CHIP SAMPLING

1. Identify areas with prepared surfaces. This includes building materials, components and fixtures finished with a coating such as paint, stain and varnish. Wallpaper can mask prepared surfaces and these areas should be included in the survey.

2. Select appropriate materials and locations to be sampled. When sampling painted interior surfaces, representative samples must be obtained per client instruction or in general compliance with the most current revision of the Department of Housing and Urban Development *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards Housing*, June 1995revision.

3. A heating tool and chisel is recommended to collect representative samples of painted surfaces, but a knife, chipping hammer or paint scraper may also be used. Minimum force should be used to prevent the generation of dusts and particles. Wear protective goggles, abrasion resistant gloves and/or particulate respirator as appropriate to the task.

Check with the analytical laboratory you will use to determine minimum sample size required. A two square inch (2 in^2) sample is recommended for each sample. The sample size should be documented on the sample log. Some laboratories conducting toxic characteristic leaching procedures (TCLP) analysis may request up to ten grams (10 g) per sample. Lead-based paint samples must be removed down to the bare substrate to ensure each layer of paint has been collected. Use a brush or mini-vacuum to clean up residual material and place it in the sample container.

4. Assign a sample number to each sample collected. Affix a label or mark the sample container indelibly with a sample identification number. Seal the sample container securely. Document descriptions and locations of each surface sampled on a field log. It is recommended that a photograph depicting the material and location be taken.

5. Send results and chain or custody to an American Industrial Hygiene Association (AIHA) accredited laboratory for analysis.

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Monitoring Well Data Sheet

Project Name:	Project #:

Monitoring Well ID	Date	Sample Time	Measurements			Calculations			Notes
			Depth to Water (DTW)	Total Depth of Well (TD)	Depth to Product (DTP)	Product Thickness (DTW-DTP)	Water Column Length (TD-DTW)	Purge Volume (Unit/Ltr)	Comments

Notes:

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Monitoring Well Data Sheet

Project Name:	Project #:

Monitoring Well (ID)	Date	Time	Measurements			Parameters / Calculations					
			Depth to Water (DTW; ft)	Total Depth of Well (TD; ft)	Water Column (TD - DTW)	Purge Volume (Gal-Ltr)	Temp (°F-C)	DO (mg/L)	Cond (µs/cm)	pH (pH)	ORP (mV)

Notes:

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Groundwater Sample Quality Control Log
(Liters/Flow Rate/Purge Time)

Project #: _____ Project Name: _____
Sample ID: _____ Sample Location: _____
Sample Date: _____ Sample Time: _____ Sampler's Name: _____

Equipment Decontamination

Equipment	Decontaminated prior to use?	Decontamination Method
	Yes No	
	Yes No	
	Yes No	

Well Measurements

Casing Diameter (inches): _____ Casing Elevation Reference Point: _____
Depth to Product (DTP; ft): _____ Thickness of Product (DTW – DTP; ft): _____
Depth to Water (DTW; ft): _____ Length of Water in Well (TD – DTW; ft): _____
Total Depth of Well (TD; ft): _____

Casing Volume Calculations

Well casing volume (gal) = $\left(\text{Unit Casing Volume } {}^{gal}/_{ft}\right)\left(\text{length of water in well } (ft)\right)$ = _____

Three Casing Volumes (gal) = (3)(Well Casing Volume (gal)) = _____

Casing Diameter (in)	1	1.5	2	4	6	8
Unit Casing Volume (gal/ft)	0.04	0.1	0.16	0.65	1.5	2.6

Conversions:	1 gallon = 3.8 L	1 L = 1.057 quarts
	1 ft^3 7.48 gallons	1 L = 1000 mL

Water Quality Parameters

Purging Start Time: _____ Purging End Time: _____ Total Purge Time: _____ Purged dry? Y N

Time	Purge Volume (L) or (gallons)	Temp. (°C) or (°F)	D.O. (mg/L)	Conductivity (mS/cm)	pH	ORP (mV)	Water Description (color, odor, sheen, etc.)

Sample Information

Container (type and volume)	Supplied by lab?	Preserved?	Field Filtered?	Analyses Requested
	Y N	Y N	Y N	
	Y N	Y N	Y N	
	Y N	Y N	Y N	

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Groundwater Sample Quality Control Log
(Liters/Flow Rate/Purge Time)

Project #: ______ Project Name: ______
Sample ID: ______ Sample Location: ______
Sample Date: ______ Sample Time: ______ Sampler's Name: ______

Equipment Decontamination

Equipment	Decontaminated prior to use?	Decontamination Method
Water Level Probe	Yes No	Alconox wash, tap water rinse, DI rinse
Water Quality Meter / Flow Cell	Yes No	Alconox wash, tap water rinse, DI rinse

Well Measurements

Casing Diameter (inches): ______ Casing Elevation Reference Point: ______
Depth to Product (DTP; ft): ______ Thickness of Product (DTW – DTP; ft): ______
Depth to Water (DTW; ft): ______ Length of Water in Well (TD – DTW; ft): ______
Total Depth of Well (TD; ft): ______

Calculation of Flow Rate

Desired Flow Rate (L/min): 0.20 L/min Volume of Container (L): ______ Time to Fill Container (sec.): ______

$$Flow\ Rate\ \left(\frac{L}{min.}\right) = \left(\frac{Volume\ of\ Container\ (L)}{Time\ to\ Fill\ Container\ (sec.)}\right)\left(\frac{60\ sec.}{1\ min.}\right) = \_\_\_\_\_\_$$

Calculation of Approximate Purge Time

$$Well\ casing\ volume\ (L) = \left(Unit\ Casing\ Volume\ {}^{L}/_{ft}\right)\left(\begin{matrix}length\ of\\ water\ in\ well\end{matrix}\ (ft)\right) = \_\_\_\_\_\_$$

$$Purge\ Time\ (min.) = \frac{(Well\ Casing\ Volume\ (L))(\#\ of\ Casing\ Volumes\ to\ Purge)}{Flow\ Rate\ ({}^{L}/_{min.})} = \_\_\_\_\_\_$$

Casing Diameter (in)	1	1.5	2	4	6	8
Unit Casing Volume (L/ft)	0.15	0.38	0.61	2.5	5.7	9.8

Conversions:		
	1 gallon = 3.8 L	1 L = 1.057 quarts
	1 ft³ = 7.48 gallons	1 L = 1000 mL

Water Quality Parameters

Purging Start Time: ______ Purging End Time: ______ Total Purge Time: ______ Purged dry? Y N

Time	Purge Volume (L) or (gallons)	Temp. (°C) or (°F)	D.O. (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Description (color, odor, sheen, etc.)

Sample Information

Container (type and volume)	Supplied by lab?	Preserved?	Field Filtered?	Analyses Requested
	Y N	Y N	Y N	
	Y N	Y N	Y N	

Field Boring (BH) Log ____________________

Page _____ of _____

Project:	Client:
Site:	

Depth	Lithology Graphic Log	Location: Description: USCS Name, Components, Color, Moisture, Consistancy, Density, Other.	Water Level	Sample Type	Recovery (%)	PID (ppm)	Depth
		Surface					
0							0
5							5
10							10
15							15
20							20

Advancement Method: Direct Push	Notes:
Abandonment Method:	

Soil & Groundwater Observations:	Terracon	Start Date:	Driller:
		Time:	Drill Rig:
		End Date:	Project #:
		Time:	Exhibit:

Field Boring and Well (MW) Construciton Log _____ Page _____ of _____

Project:	Client:
Site:	

Depth	Lithology Graphic Log	Location: / Descr: USCS Name, Components, Color, Moisture, Consistancy, Density, Other.	Installation Details: Well Completion: Details	Annulus	Well	Water Level	Sample Type	Recovery (%)	PID (ppm)	Depth
0		Surface								0
5										5
10										10
15										15
20										20

Advancement Method:	Notes:
Abandonment Method:	
Soil & Groundwater Observations:	

Terracon

Start Date:	Driller:
Time:	Drill Rig:
End Date:	Project #:
Time:	Exhibit:

2018c Terracon Consultants, Inc., 2018. Phase I Environmental Site Assessment, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County, Utah, EPA Cooperative Agreement No. 96835701, Hazardous Substance Grant for Redevelopment Agency of Salt Lake City. Terracon Project No. 61177082. Dated February 14, 2018.

Phase I Environmental Site Assessment

Schovaers Electronics

22 South Jeremy Street

Salt Lake City, Salt Lake County, Utah

February 14, 2018

Terracon Project No. 61177082 Task L

EPA Cooperative Agreement No. 96835701

EPA ACRES PROPERTY ID# 199723

HAZARDOUS MATERIALS AND PETROLUEM GRANT FOR SALT LAKE COUNTY

Prepared for:
Salt Lake County
Salt Lake City, Utah

Prepared by:
Terracon Consultants, Inc.
Midvale, Utah

February 14, 2018

Salt Lake County
2001 S. State St., Suite S2-100
P.O. Box 144575
Salt Lake City, UT 84114-4575

Attn: Mr. Ruedigar Matthes
P: (385) 468.4868
E: rmatthes@slco.org

Re: Phase I Environmental Site Assessment
Schovaers Electronics
22 South Jeremy Street
Salt Lake City, Salt Lake County, Utah
Terracon Project No. 61177082
EPA Cooperative Agreement #96835701

Dear Mr. Matthes:

Terracon Consultants, Inc. (Terracon) is pleased to submit the enclosed Phase I Environmental Site Assessment (ESA) report for the above-referenced site. This assessment was performed in accordance with Terracon's Salt Lake County Brownfield Assessment Grant Bid Proposal, dated December 1, 2017 and Contract for Environmental Engineering Services No. 0000000772, dated February 2017. This assessment was conducted under EPA Cooperative Agreement #96835701 for the Hazardous Materials and Petroleum Substances grant.

We appreciate the opportunity to be of service to you on this project. In addition to Phase I services, our professionals provide geotechnical, environmental, construction materials, and facilities services on a wide variety of projects locally, regionally and nationally. For more detailed information on all of Terracon's services please visit our website at www.terracon.com. If there are any questions regarding this report or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,
Terracon Consultants, Inc.

Tina Cheney
ESA Group Manager

Benjamin B. Bowers
Environmental Department Manager

Attachments

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APPENDICES

EXECUTIVE SUMMARY

This Phase I Environmental Site Assessment (ESA) was performed accordance with Terracon's Salt Lake County Brownfield Assessment Grant Bid Proposal, dated December 1, 2017, and Contract for Environmental Engineering Services No. 0000000772, dated February 15, 2017, and was conducted consistent with the procedures included in ASTM E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. The ESA was conducted under the supervision or responsible charge of Tina Cheney, Environmental Professional who performed the site reconnaissance on December 13, 2017.

The Salt Lake County Brownfield Assessment Grant is funded with U.S. Environmental Protection Agency, Region 8 (EPA) Brownfields Hazardous Substances and Petroleum Assessment Cooperative Agreement #96835701.

Findings and Opinions

A summary of findings is provided below. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein.

Site Description and Use

The site is an approximately 0.34-acre parcel (Parcel ID #15-02-204-007). An approximately 6,000-square-foot industrial building occupies the site. An approximately 672-square-foot garage is present on the northwest side of the site. Paved parking areas are located to the east and north of the building. A small weedy area is present on the western boundary area. The building is currently vacant.

Historical Information

The site was residential from at least 1898 to the mid-1940s. The residences were demolished by the late 1940s and the current commercial building was constructed in 1956. The site building was originally occupied by an electrical supply company and then a wholesale upholstery business before Schovaers occupied the building in 1977. The site was operated as Schovaers until April 2017, and now the site is vacant.

The property to the north was undeveloped in 1898. By 1911 the property was residential, and remained until the 1960s. Crown Plating has occupied the property since 1965 to the current day. To the east was Jeremy Street, followed by undeveloped land from at least 1898 to the 1950s. By 1958 the current building was visible to the northeast, and used by Greater Mountain Chemical Company of Utah from at least 1962 to 1972, a soap company in 1977, Creed Laboratories in 1982, Chembrite in the 1990s, and Heritage Forge from at least 2009 to 2017. The properties to the south were residential from at least 1898. By 1911 a railroad line was present, followed by

residences. In 1962 a janitorial supply company was listed, a laundry parts repair was listed in the 1970s to 1990s, and then the property appear to have been used as auto repair since the 1990s. The west adjoining property was residential from at least 1898 to 1911. By 1937 the residences were demolished and the property was vacant until the current structure was built in 1969. The building has been occupied by Continental Industries of Utah carpet, Indico Distributing, floor coverings, Utah Paperbox Company, Uinta Urethane Recyclers, and most recently EPC International/Uinta Urethane Recyclers.

Records Review

The site was identified on the RCRA (Facility ID #UTD088325769) and Brownfields (Facility ID 199723) databases. A Phase I and Phase II report were identified in connection with the Brownfields listing and are discussed in Section 3.7. Soil and groundwater impacts were identified at the site, and represent a Recognized Environmental Condition (REC).

The north-adjoining facility was listed as the Crown Plating Company, Inc. RCRA small quantity generator and a Brownfields facility. Based on numerous violations in the mid-1980s to early 1990s due to the known improper disposal of 1,1,1, trichlororethane (TCA) on the property boundary, this RCRA listing represents a REC to the site.

Multiple other facilities were noted; however, the remaining facilities do not represent a REC to the site. Refer to Section 4.1 for more detailed information regarding the findings.

Site Reconnaissance

Based on the site inspection there was an air compressor, heating and cooling systems, a sump, pole mounted transformers, and pavement staining was observed. The sump and staining represent a REC to the site, based on the long-term use of the site as an electroplating shop and the known soil and groundwater contamination on the site.

Adjoining Properties

The site is adjoined to the north by Crown Plating, an electroplating facility, to the east by Jeremy Street, and Heritage Forge, a metal forge and decorative stone facility, and to the south by vehicle repair shops. An industrial warehouse adjoins the site to the west. The north-adjoining Crown Plating facility is a REC based on the regulatory information and known releases.

Significant Data Gaps

No significant data gaps were identified.

Conclusions

We have performed a Phase I ESA consistent with the procedures included in ASTM Practice E 1527-13 of the Schovaers Electronics facility located at 22 South Jeremy Street, Salt Lake City, Salt Lake County, Utah. The following RECs or Controlled RECs (CREC) were identified in connection with the site:

- **Impacts from north-adjoining property:** The north-adjoining property has documented improper disposal of TCA very near or on the property line. This identified release represents a REC to the site.

- **Long-term industrial use:** The site has been an electroplating shop for approximately 40 years. Evidences of releases from these industrial operations were widespread and included leaking and spilling. Historical solvent uses, RCRA hazardous waste storage and disposal, wastewater discharge system, and staining are considered part of the long-term industrial use REC at the site.

- **Soil and Groundwater impacts at the site**: Based on Terracon's Phase II ESA, dated February 8, 2016, sampling at the site identified soil impacts of hexavalent chromium concentrations above industrial and/or residential Regional Screening Levels (RSLs) in shallow soils across the site. Groundwater has been impacted by trichloroethene (TCE) above Maximum Contaminant Levels (MCLs) and/or Vapor Intrusion Screening Levels (VISLs), and hexavalent chromium below MCL and above the tapwater RSL.

Recommendations

Based on the scope of services, limitations, and conclusions of this assessment, Terracon recommends the following additional actions.

- An additional Phase II ESA to assess the vertical and horizontal extent of impacts to soils or groundwater at the site in order to develop cleanup planning documents for the site.

1.0 INTRODUCTION

1.1 Site Description

Site Name	Schovaers Electronics
Site Location/Address	22 South Jeremy Street, Salt Lake City, Salt Lake County, Utah
Land Area	Approximately 0.34 acres
Site Improvements	One approximately 6,000-square-foot warehouse building and one approximately 672-square-foot open shed.
Anticipated Future Site Use	Redevelopment for commercial use
Purpose of the ESA	Redevelopment of the site

The location of the site is depicted on Exhibit 1 of Appendix A, which was reproduced from a portion of the USGS 7.5-minute series topographic map. The site and adjoining properties are depicted on the Site Diagram, which is included as Exhibit 2 of Appendix A. Acronyms and terms used in this report are described in Appendix F.

1.2 Scope of Services

This Phase I ESA was performed in accordance with our contract for Environmental Engineering Services with Salt Lake County (Contract Number 00000000772, dated February 15, 2017). This assessment was conducted under EPA Cooperative Agreement #96835701 for the Hazardous Materials and Petroleum Substances grant and was conducted consistent with the procedures included in ASTM E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. The purpose of this ESA was to assist the client in developing information to identify RECs in connection with the site as reflected by the scope of this report. This purpose was undertaken through user-provided information, a regulatory database review, historical and physical records review, interviews, including local government inquiries, as applicable, and a visual noninvasive reconnaissance of the site and adjoining properties. Limitations, ASTM deviations, and significant data gaps (if identified) are noted in the applicable sections of the report.

ASTM E1527-13 contains a new definition of "migrate/migration," which refers to “the movement of hazardous substances or petroleum products in any form, including, for example, solid and liquid at the surface or subsurface, and vapor in the subsurface.” By including this explicit reference to migration in ASTM E1527-13, the Standard clarifies that the potential for vapor migration should be addressed as part of a Phase I ESA. This Phase I ESA has considered vapor migration in evaluation of RECs associated with the site.

1.3 Standard of Care

This ESA was performed in accordance with generally accepted practices of this profession, undertaken in similar studies at the same time and in the same geographical area. We have endeavored to meet this standard of care, but may be limited by conditions encountered during performance, a client-driven scope of work, or inability to review information not received by the report date. Where appropriate, these limitations are discussed in the text of the report, and an evaluation of their significance with respect to our findings has been conducted.

Phase I ESAs, such as the one performed at this site, are of limited scope, are noninvasive, and cannot eliminate the potential that hazardous, toxic, or petroleum substances are present or have been released at the site beyond what is identified by the limited scope of this ESA. In conducting the limited scope of services described herein, certain sources of information and public records were not reviewed. It should be recognized that environmental concerns may be documented in public records that were not reviewed. No ESA can wholly eliminate uncertainty regarding the potential for RECs in connection with a property. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for RECs. No warranties, express or implied, are intended or made. The limitations herein must be considered when the user of this report formulates opinions as to risks associated with the site or otherwise uses the report for any other purpose. These risks may be further evaluated – but not eliminated – through additional research or assessment. We will, upon request, advise you of additional research or assessment options that may be available and associated costs.

1.4 Additional Scope Limitations, ASTM Deviations and Data Gaps

Based upon the agreed-on scope of services, this ESA did not include subsurface or other invasive assessments, vapor intrusion assessments or indoor air quality assessments (i.e. evaluation of the presence of vapors within a building structure), business environmental risk evaluations, or other services not particularly identified and discussed herein. Credentials of the company (Statement of Qualifications) have not been included in this report but are available upon request. Pertinent documents are referred to in the text of this report, and a separate reference section has not been included. Reasonable attempts were made to obtain information within the scope and time constraints set forth by the client; however, in some instances, information requested is not, or was not, received by the issuance date of the report. Information obtained for this ESA was received from several sources that we believe to be reliable; nonetheless, the authenticity or reliability of these sources cannot and is not warranted hereunder. This ESA was further limited by the following:

- The historical use of the site was not identified back to when the site was undeveloped, as the earliest ascertainable standard historical source identified the site as developed with residences in 1898. Based on the original non-suspect residential development of the site, this data gap is not deemed to be significant.

An evaluation of the significance of limitations and missing information with respect to our findings has been conducted, and where appropriate, significant data gaps are identified and discussed in the text of the report. However, it should be recognized that an evaluation of significant data gaps is based on the information available at the time of report issuance, and an evaluation of information received after the report issuance date may result in an alteration of our conclusions, recommendations, or opinions. We have no obligation to provide information obtained or discovered by us after the issuance date of the report, or to perform any additional services, regardless of whether the information would affect any conclusions, recommendations, or opinions in the report. This disclaimer specifically applies to any information that has not been provided by the client.

This report represents our service to you as of the report date and constitutes our final document; its text may not be altered after final issuance. Findings in this report are based upon the site's current utilization, information derived from the most recent reconnaissance and from other activities described herein; such information is subject to change. Certain indicators of the presence of hazardous substances or petroleum products may have been latent, inaccessible, unobservable, or not present during the most recent reconnaissance and may subsequently become observable (such as after site renovation or development). Further, these services are not to be construed as legal interpretation or advice.

1.5 Reliance

This ESA report is prepared for the exclusive use and reliance of Salt Lake County and Euclid, LC. Use or reliance by any other party is prohibited without the written authorization of Salt Lake County and Terracon Consultants, Inc. (Terracon).

Reliance on the ESA by the client and all authorized parties will be subject to the terms, conditions and limitations stated in the proposal, ESA report, and Terracon's Agreement. The limitation of liability defined in the Agreement is the aggregate limit of Terracon's liability to the client and all relying parties.

Continued viability of this report is subject to ASTM E1527-13 Sections 4.6 and 4.8. If the ESA will be used by a different user (third party) than the user for whom the ESA was originally prepared, the third party must also satisfy the user's responsibilities in Section 6 of ASTM E1527-13.

1.6 Client Provided Information

Prior to the site visit, Ruedigar Matthes, client's representative, was asked to provide the following user questionnaire information as described in ASTM E1527-13 Section 6. Mr. Justin Belliveau, of Euclid, LC, also completed the user questionnaire.

Client Questionnaire Responses

Client Questionnaire Item	Client Did Not Respond	Client's Response	
		Yes	No
Specialized Knowledge or Experience that is material to a REC in connection with the site.			X
Actual Knowledge of Environmental Liens or Activity Use Limitations (AULs) that may encumber the site.			X
Actual Knowledge of a Lower Purchase Price because contamination is known or believed to be present at the site.			X
Commonly Known or Reasonably Ascertainable Information that is material to a REC in connection with the site.		X	
Obvious Indicators of Contamination at the site.		X	

Mr. Matthes and Mr. Belliveau stated a Phase II was completed for the site that suggested there is contamination. Additional information about the report is in Section 3.7. Copies of the questionnaires are included in Appendix C.

2.0 PHYSICAL SETTING

Physical Setting Information		Source
Topography		
Site Elevation	Approximately 4,230 feet above sea level	USGS Topographic Map, Salt Lake City, North, Utah Quadrangle, 1963, photo-revised in 1969 and 1975 (Appendix A)
Topographic Gradient	Surface runoff and topographic gradient at the site is relatively flat.	
Closest Surface Water	The Jordan River is approximately half a mile west of the site.	
Soil Characteristics		
Soil Type	UL – Urban Land	Web Soil Survey http://websoilsurvey.nrcs.usda.gov
Description	Fill	
Geology/Hydrogeology		
Formation	Qtg – Terrace Gravels	Utah Geological Survey http://geology.utah.gov
Description	Pebble and cobble gravel, sand and silt occurring a few to several tens of meters above modern flood plains.	

Physical Setting Information		Source
Estimated Depth to Groundwater	10-12 feet	Terracon's Phase II, *Schovaers Electronics Facility*, dated February 8, 2016
Hydrogeologic Gradient	West, southwest	

3.0 HISTORICAL USE INFORMATION

Terracon reviewed the following historical sources to develop a history of the previous uses of the site and surrounding area, in order to help identify RECs associated with past uses. Copies of selected historical documents are included in Appendix C.

3.1 Historical Topographic Maps, Aerial Photographs, Sanborn Maps

Readily available historical USGS topographic maps, selected historical aerial photographs (at approximately 10 to 15 year intervals) and historical fire insurance maps produced by the Sanborn Map Company were reviewed to evaluate land development and obtain information concerning the history of development on and near the site. Reviewed historical topographic maps, aerial photographs and Sanborn maps are summarized below.

Historical fire insurance maps produced by the Sanborn Map Company were requested from EDR to evaluate past uses and relevant characteristics of the site and surrounding properties. EDR provided Sanborn maps as summarized below.

- Topographic map: Salt Lake City North, Utah, published in 1998 from **1997** aerial photographs
- Aerial photographs: EDR, **1937, 1946, 1950, 1958, 1962, 1965, 1971, 1977, 1981, 1993, 1997, 2003,** and **2014**; all photographs were scaled to 1"=500'. / Google Earth Historical Aerials, 2006, interactive scale
- Sanborn Fire Insurance Map(s): **1898, 1911, 1949, 1950, 1986**

Historical Topographic Maps, Aerial Photographs and Sanborn Maps

Direction	Description
Site	Residential development is visible (1898-1911). The residence on the south side has been demolished and the northern residence remains (1937-1946). The site is vacant (1949-1950). The current warehouse building occupies the site (1958-1981). A rail spur is visible along the southern section of the site, which terminates at the west boundary area of the site (1986-2009). The site is visible with the current warehouse and removed rail spur (2014).
North	The property appears undeveloped (1898). The property appears residential (1911-1962). The south section of the warehouse is present (1965-1981). The warehouse is expanded northward, comprising the current building configuration (1986-2014).

Direction	Description
East	Jeremy Street and undeveloped property is visible (1898-1952). Due east of the site, undeveloped property is visible. Northeast of the site, the current stone facility building is visible (1958-1981). Some small exterior storage is visible in the undeveloped area of the property. The current commercial building is still present (1993-2003). The property appears to be used as an exterior storage yard of stone and other products associated with the building north of the yard (2006-2014).
South	Residential property occupies the south-adjoining property (1898). A railroad line is present. Residential property is visible south of the rail line followed by residences (1911-1958). The rail line and residential property are visible (1962). The rail line and commercial buildings are visible (1965-2006). The rail line appears removed, and a vacant strip of property is visible, with commercial buildings present to the south (2014).
West	Residential property is present to the west (1898-1911). The property appears vacant (1937-1965). A commercial building occupies the property (1971-2014).

3.2 Historical City Directories

The R. L. Polk City Directories used in this study were made available through the Salt Lake City Public Library (selected years reviewed: 1946, 1952, 1957, 1962, 1967, 1972, 1977, 1982, 1987, 1993, 1999, 2005, 2009, and 2015) and were reviewed at approximate five-year intervals, if readily available. Since these references are copyright protected, reproductions are not provided in this report. The current street address for the site was identified as 22 South Jeremy Street.

Historical City Directories

Direction	Description
Site	**22 South Jeremy Street:** No listing (1946-1952). General Cable Corporation, electrical supplies (1962-1972). Keystone Brothers, wholesale upholstery (1977). Bob Schovaers Tactile Signs 7 Engraving (1999). Schovaers Electronics Corporation (1982, 1993, 2005-2015).
North	**8 and 14 South Jeremy Street**: No listing (1946-1962). Crown Plating, Inc. (1967-1982, 1993-2015).
East	**15 South Jeremy Street**: No listing (1946-1957). Greater Mountain Chemical Company of Utah (1962-1972). The Soap Company (1977). Creed Laboratories (1982). Chembrite, chemical products (1993-1999). No listing (2005). Alexander Clark Enterprises, ornamental metal work (2009-2015).
South	**42 South Jeremy Street**: Residential, sheet metal worker (1946-1952). Residential (1957). Rainbow Sales Company, janitorial supplies (1962). Western Broom Company (1967-1972). Laundry Equipment Parts, electrical repair (1977-1982, 1993-1999). Residential (2009). No listing (2005, 2015).
West	**25 South 900 West**: No listing (1946-1967). Continental Industries of Utah carpet (1972). Indico Distributing, floor coverings (1977). Utah Paperbox Company (1993). Uinta Urethane Recyclers (2005). EPC International/Uinta Urethane Recyclers (2009). No listing (1999, 2015).

3.3 Site Ownership

Based on a review of information obtained from the City or County assessor's records, the current site owner is Party of Six, LLC.

3.4 Title Search

County Deed Records were reviewed by of Texas Environmental Research of Rockwall, Texas, to obtain a chain-of-title for the site. Ownership records were reviewed back to 1939. Owners included individuals or individuals and their spouses until 1977, when ownership transferred to Schovaers Electronics Corporation. Schovaers Electronics Corporation transferred title to Party of Six, LLC on June 26, 2017. According to Mr. Schovaers they closed the Schovaers Electronics Corporation and transferred the title to the six Schovaers siblings. The title information is included in Appendix C.

3.5 Environmental Liens and Activity and Use Limitations

At the direction of the client, performance of a review of environmental liens and activity and use limitations was included as part of the scope of services, for which Terracon engaged Texas Environmental Research of Rockwall, Texas. Based on a review of the title provider's research, environmental lien and activity and use limitation records were not identified.

Additionally, the EDR regulatory database report included a review of both Federal and State Engineering Control (EC) and Institutional Control (IC) databases. Based on a review of the database report, the site was not listed on the EC or IC databases.

3.6 Interviews Regarding Current and Historical Site Uses

The following individual was interviewed regarding the current and historical use of the site.

Interviews

Interviewer	Name / Phone #	Title	Date/Time
Tina Cheney	Mr. Bob Schovaers (801) 521-2668	Owner/Owner Representative	December 13, 2017

Mr. Schovaers indicated they removed all chemicals and supplies from the building earlier in the year. Other than the previous Phase I and Phase II conducted on the site, Mr. Schovaers did not have additional information to provide to Terracon, other than they used limited quantities of chlorinated solvents for cleaning over the years. They would apply a small amount to a cloth for cleaning parts. He does not believe his facility has impacted the groundwater.

3.7 Prior Report Review

Terracon requested the client provide any previous environmental reports they are aware of for the site. Previous reports were provided by the client to Terracon for review.

- Phase I ESA
  22 South Jeremy Street
  Dated: June 2, 2015
  Prepared by: Terracon Consultants
  For: The Redevelopment Agency of Salt Lake City
- Phase II ESA
  22 South Jeremy Street
  Dated: February 8, 2016
  Prepared by: Terracon Consultants
  For: The Redevelopment Agency of Salt Lake City

The Terracon Phase I identified RECs with the site, including the north-adjoining property that had improper disposal of 1,1,1, trichlororethane (TCA) near the property line and the long-term industrial use of the site as an electroplating shop.

Terracon conducted a Phase II ESA to investigate the potential impacts to the sites soil and groundwater. Soil impacts included hexavalent chromium concentrations above industrial and/or residential EPA Regional Screening Levels (RSLs) in shallow soils across the site. Groundwater had been impacted by trichloroethene (TCE) in the western and northwest portion of the site above MCLs and/or VISLs, and hexavalent chromium below MCL and above the tapwater RSL. Further evaluation was recommended to address the impacts and planned use of the site.

4.0 RECORDS REVIEW

Regulatory database information was provided by GeoSearch, a contract information services company. The purpose of the records review was to identify RECs in connection with the site. Information in this section is subject to the accuracy of the data provided by the information services company and the date at which the information is updated. The scope herein did not include confirmation of facilities listed as "unmappable" by regulatory databases.

In some of the following subsections, the words up-gradient, cross-gradient and down-gradient refer to the topographic gradient in relation to the site. As stated previously, the groundwater flow direction and the depth to shallow groundwater, if present, would likely vary depending upon seasonal variations in rainfall and the depth to the soil/bedrock interface. Without the benefit of on-site groundwater monitoring wells surveyed to a datum, groundwater depth and flow direction beneath the site cannot be directly ascertained.

4.1 Federal and State/Tribal Databases

Listed below are the facility listings identified on federal and state/tribal databases within the ASTM-required search distances from the approximate site boundaries. Database definition, descriptions, and the database search report are included in Appendix D.

Federal Databases

Database	Description	Distance (miles)	Listings
BF	Brownfields Management System	0.5	10
SEMS (formerly CERCLIS)	Superfund Enterprise Management Systems	0.5	1
SEMS-ARCHIVE	Superfund Enterprise Management Systems Archived Site Inventory	0.5	4
DNPL	Delisted National Priorities List	1	0
EC	Federal Engineering Institutional Control Sites	Site	0
LUCIS	Land Use Control Information System	0.5	0
NFRAP	No Further Remedial Action Planned Sites	0.5	0
NLRRCRAG	No Longer Regulated RCRA Generator Facilities	0.125	0
NLRRCRAT	No Longer Regulated RCRA Non-CORRACTS TSD Facilities	0.5	0
NPL	National Priorities List	1	0
PNPL	Proposed National Priorities List	1	0
RCRAC	Resource Conservation & Recovery Act - Corrective Action Facilities	1	1
RCRAT	Resource Conservation & Recovery Act - Treatment Storage & Disposal Facilities	0.5	0

State/Tribal Databases

Database	Description	Distance (miles)	Listings
UTBF	Brownfield Properties	0.5	1
UTCERCLIS	CERCLIS Sites	0.5	5
UTICEC	Institutional Engineering Controls Registry	Site	0
UTLFSWDS	Landfill and Solid Waste Disposal Sites	0.5	0
UTLUST	Leaking Underground Storage Tanks	0.5	24
UTNPL	National Priorities List	1	1
UTRUST	Registered Underground Storage Tanks	Site and adjoining	1
UTTIERII	Tier II Facilities	Site	0
UTVCP	Voluntary Cleanup Program Sites	0.5	2

In addition to the above ASTM-required listings, Terracon reviewed other federal, state, local, and proprietary databases provided by the database firm. A list of the additional reviewed databases is included in the regulatory database report included in Appendix D.

The following table summarizes the site-specific information provided by the database and/or gathered by this office for identified facilities. Facilities are listed in order of proximity to the site. Additional discussion for selected facilities follows the summary table.

Listed Facilities

Facility Name and Location	Estimated Distance / Direction/Gradient	Database Listings	Is a REC, CREC, or HREC to the Site
Schovaers Electronic 22 Jeremy Street	Site	BF, RCRAGR08	REC discussed below
Crown Plating Company. 14 Jeremy Street	South-adjoining / cross- to down-gradient	BF, RCRAGR08	REC discussed below
Heritage Forge / Creed Laboratories 15 Jeremy Street	East-adjoining/ up-gradient	BF, RCRAGR08, RUST	No, file review discussed below
Bullough Insulation 50 South 800 West	Southeast-adjoining / 100 feet / cross-gradient	LUST	No, file review discussed below
Bullough Asbestos (former) 50 South 800 West	Southeast-adjoining / 100 feet / cross-gradient	CERCLA / SEMSARCH	No, file review discussed below

Schovaers Electronics

The site was identified on the RCRA small quantity generator (Facility ID #UTD088325769) and Brownfields (Facility ID 199723) databases. According to the regulatory database, this facility is a small quantity generator that generates fewer than 1,000 kg but more than 100 kg monthly of D000 class (unspecified), corrosive waste and lead. Files reviewed at the Division of Solid and Hazardous Waste indicated a compliance evaluation inspection was conducted on the facility in 1996. Based on the inspection by the Division of Solid and Hazardous Waste, the facility was found to be in violation of their hazardous waste storage. Drums were observed without "hazardous waste" or container content labels, without accumulation dates, and the drums were left open. The remaining violations consisted of records keeping in the facility. The facility was lacking a Contingency Plan, Personnel Training Plan, and Preparedness and Prevention Documentation. Compliance inspections were conducted at the facility again in 2009 and 2014, and no problems were noted (Appendix D). A Phase I and Phase II report were identified in connection with the Brownfields listing and are discussed in Section 3.7. Soil and groundwater impacts were identified at the site, and represent a REC.

Crown Plating Company, Inc

The north-adjoining facility was identified on the RCRAGR08 (Facility ID #UTD009086372), and Brownfields (Facility ID 199141) databases. Terracon reviewed the facility's regulatory files on record with the Division of Solid and Hazardous Waste. In the mid-1980s to the early 1990s, the

facility was inspected and found to be in violation of improper storage of materials, drums and containers lacking labels, corroding drums, unsealed drums and disposal of hazardous waste from the facility without hazardous waste manifests to verify proper disposal occurred. Inspections conducted during this time frame also documented the cluttered nature of the storage at the facility. The storage and disposal of sludge produced from the rinse baths at the facility and the use, storage, and disposal of spent 1,1,1-trichloroethane (TCA) and methylene chloride. The TCA and methylene chloride were used at the facility for degreasing purposes. The hazardous waste inspections conducted during this time frame indicated the TCA was being disposed of through evaporation and by pouring the spent degreaser on the ground on the southeast section of the property, immediately adjacent to the site.

Currently, the facility is classified as a small quantity generator. According to the most recent Compliance Evaluation Inspection conducted in December 2013, this facility produces approximately 600 to 700 pounds of sludge monthly. The sludge is classified as a hazardous waste due to the amount of chrome (hexavalent chromium) it contains. Approximately 20 gallons of methylene chloride, used as a paint stripper, is also produced monthly. No violations were noted in the most recent compliance evaluation.

Based on the violations noted in the inspections that occurred in the mid-1980s to the early 1990s, documented poor housekeeping practices, improper to absent drum labeling, and the improper disposal of hazardous waste onto the ground at the facility within 5 to 25 feet of the site's northern boundary line, this RCRA facility represents a REC to the site.

Creed Laboratories UST/Heritage Forge BF

The Creed Laboratories facility (Facility ID #4001520) formerly adjoined the site to the east. DERR records were limited; however, closure notice and closure plan documents for the facility indicated two 2,000-gallon diesel underground storage tanks were removed from the facility in September 1989. The closure plan noted one tank to contain diesel and the second tank to contain butyl CELLOSOLVE™, a glycol ether-based solvent. Two soil samples were collected at a depth during the closure and analyzed for total petroleum hydrocarbons and BTEX. Analytical results indicated constituents were not present above laboratory detection limits. Based on the clean closure and length of time since the UST closure, in Terracon's opinion, this listing does not represent a REC to the site.

The former Creed Laboratories, also known as Chembrite, was also identified as a RCRA Small Quantity Generator (Facility ID #UTD089326235) that produced more than 100 kg but less than 1,000 kg of hazardous waste monthly. Chembrite formulated, packaged, and sold cleaning agents and detergents. Although the regulatory database and the EPA Notification of Regulated Waste Activity form did not list what type of hazardous waste was produced at the site, informal notes in the regulatory files for the facility indicated some of the wastes produced included halogenated and non-halogenated solvents, including 1,1,1 trichloroethane (TCA). Several inspections by the DSHW occurred at the facility between 1985 and 1991. In the 1991 inspection, the DSHW noted the mixing vats were located over a floor drain, and overflow from the vats

discharged into this drain. Furthermore, it was noted a channel had been cut in the floor by unknown liquid in the vats; it was surmised to be a strong acid solution. Only one violation was noted against the facility, which was due to the failure to file a hazardous waste notification. The owner of Chembrite stated the facility did not generate or dispose of hazardous waste. Inspections conducted by the DSHW concurred with the owner, on the basis that the vats used in the production process of cleaning products and detergents were discharging into the sanitary sewer, which was approved by the City. However, in the last inspection, conducted in 1991, the DSHW recommended investigating the drains due to the questioning nature regarding proper connection of the drains to the sewer system. No follow-up investigation reports were in the file. The regulatory file was closed in 2001, indicating that the facility was no longer regulated by the DSHW. Terracon completed a Phase II discussed below that sampled for these chemicals of concern.

The Heritage Forge Brownfields listing (Facility ID 199141) identified a Phase I and Phase II reports prepared by Terracon, (Phase I ESA dated July 2, 2015 and Phase II dated January 6, 2016). The reports indicated the facility is a metal fabrication shop and stone production suppliers. The Phase I identified a REC, based on the long-term industrial used of the site as chemical laboratory and manufacturing facility, and the long-term use of chlorinated solvents. Sampling identified VOCs in one soil sample (HF-SB07) above screening levels, which was on the east side of the building, and in groundwater in five sample locations. VOCs were detected in HF-SB10 groundwater sample, on the northwest corner of the Heritage Forge property (approximately 230 feet northeast, cross to down-gradient from the site. VOCs were not detected in the groundwater in the other three samples collected along the west side of the Heritage Forge property. In addition, Terracon conducted a Phase II at the Schovaers site in November 2015 and groundwater impacts were not identified in any of the boring locations located in the eastern half of the site. Based on the sampling results reviewed and gradient, this facility does not represent a REC to the site.

<u>Bullough Insulation/Bullough Asbestos</u>

The LUST facility (Facility ID #4001968) had two underground storage tanks, one 4,000-gallon unleaded gasoline and one 3,000-gallon gasoline, and a dispenser removed from the facility in 1993. Analysis of the water collected from the tank pit area indicated TPH and BTEX concentrations were well below current ISL levels. The maps in the UST closure notice indicated the former tank pit area was located approximately 335 feet cross-gradient of the site. The site was closed by DERR in May 1995 through an internal memo. Based on the regulatory status, the minimal impacts present, the distance of the tank pit to the site and cross-gradient position of the facility with respect to the site, this former LUST facility does not represent a REC to the site.

This facility was also identified as the CERCLA / SEMSARCH facility (Facility ID # UTN000802419). According to the regulatory database and DERR records, a removal assessment was conducted by the EPA in August 2004. There were two structures located on the property: one long white building and one metal storage structure. Observations along the north side of the metal structure found several patches of asbestos insulation residue. Removal

of the substance was completed in October 2004, and facility records were archived in April 2006. Based on remedial efforts and type of contaminant, this former CERCLA SEMSARCH facility does not represent a REC to the site.

The remaining facilities listed in the database report do not appear to represent RECs to the site at this time based upon regulatory status, apparent topographic gradient, and/or distance from the site.

Unlocatable facilities are those that do not contain sufficient address or location information to evaluate the facility listing locations relative to the site. The report listed no facilities in the unlocatable section. Determining the location of unmapped facilities is beyond the scope of this assessment; however, none of these facilities were identified as the site or adjacent properties. These facilities are listed in the database report in Appendix D

4.2 Local Agency Inquiries

Agency Contacted/ Contact Method	Response
Salt Lake County Department of Environmental Health envhealthGRAMA@slco.org	According to Ms. Maxfield, no records of environmental concern were identified for the site.
DERR Interactive Map / http://enviro.deq.utah.gov/	Regulated facilities were identified on the DERR Interactive Map for the site and surrounding properties, and are discussed in Section 4.1. Incident reports were identified for the north, east, and southwest-adjoining properties. The incidences do not appears to have a significant impact on the site.
Salt Lake City / http://www.slcgov.com/recorder/request-record	According to Ms. Killinger there is an expired hazardous materials permit for the site.

5.0 SITE RECONNAISSANCE

5.1 General Site Information

Information contained in this section is based on a visual reconnaissance conducted while walking through the site and the accessible interior areas of structures, if any, located on the site. The site and adjoining properties are depicted on the Site Diagram, which is included in Exhibit 2 of Appendix A. Photo documentation of the site at the time of the visual reconnaissance is provided in Appendix B. Credentials of the individuals planning and conducting the site visit are included in Appendix E.

General Site Information

Site Reconnaissance	
Field Personnel	Tina Cheney
Reconnaissance Date	December 13, 2017
Weather Conditions	Cloudy, 30 degrees
Site Contact/Title	Bob Schovaer

Building Description				
Building Identification	**Building Use**	**Approx. Construction Date**	**Number of Stories**	**Approx. Size (ft²)**
Main Building	Office, vacant	1956	1	6,000
Garage	Personal storage	1965	1	672
Site Utilities				
Drinking Water	Salt Lake City Corporation			
Wastewater	Salt Lake City Corporation			
Electric	Rocky Mountain Power			
Natural Gas	Dominion Energy			

5.2 Overview of Current Site Occupants

The site has a 6,000-square foot office/warehouse, and a 672-square foot open shed. There is an office in the building, and the warehouse has been cleared of all supplies and chemicals.

5.3 Overview of Current Site Operations

None. The facility is currently vacant.

5.4 Site Observations

The following table summarizes site observations and interviews. Affirmative responses (designated by an "X") are discussed in more detail following the table.

Site Characteristics

Category	Item or Feature	Observed or Identified
Site Operations, Processes, and Equipment	Emergency generators	
	Elevators	

Category	Item or Feature	Observed or Identified
	Air compressors	X
	Hydraulic lifts	
	Dry cleaning	
	Photo processing	
	Ventilation hoods and/or incinerators	
	Waste treatment systems and/or water treatment systems	
	Heating and/or cooling systems	X
	Paint booths	
	Sub-grade mechanic pits	
	Wash-down areas or carwashes	
	Pesticide/herbicide production or storage	
	Printing operations	
	Metal finishing (e.g., electroplating, chrome plating, galvanizing, etc.)	
	Salvage operations	
	Oil, gas or mineral production	
	Other processes or equipment	
Aboveground Chemical or Waste Storage	Aboveground storage tanks	
	Drums, barrels and/or containers ^{3} 5 gallons	
	MSDS or SDS	
Underground Chemical or Waste Storage, Drainage or Collection Systems	Underground storage tanks or ancillary UST equipment	
	Sumps, cisterns, French drains, catch basins and/or dry wells	X
	Grease traps	
	Septic tanks and/or leach fields	
	Oil/water separators, clarifiers, sand traps, triple traps, interceptors	
	Pipeline markers	
	Interior floor drains	
Electrical Transformers/ PCBs	Transformers and/or capacitors	X
	Other equipment	

Category	Item or Feature	Observed or Identified
Releases or Potential Releases	Stressed vegetation	
	Stained soil	
	Stained pavement or similar surface	X
	Leachate and/or waste seeps	
	Trash, debris and/or other waste materials	
	Dumping or disposal areas	
	Construction/demolition debris and/or dumped fill dirt	
	Surface water discoloration, odor, sheen, and/or free floating product	
	Strong, pungent or noxious odors	
	Exterior pipe discharges and/or other effluent discharges	
Other Notable Site Features	Surface water bodies	
	Quarries or pits	
	Wastewater lagoons	
	Wells	

Site Operations, Processes, and Equipment

Air compressor

One air compressor was observed in a small lean-to building on the northern exterior wall of the site building. The air compressor was stored on asphalt-paved surfaces. Staining was noted on the compressor and on the asphalt paving. Due to the limited source and generally non-hazardous nature of compressor oil, this staining represents a *de minimis* condition to the site

Heating and/or cooling systems

The facility is heated by natural gas hanging units in the warehouse. The office space is heated and cooled with a roof mounted system. No RECs were identified with the heating and cooling systems at the site.

Underground Chemical or Waste Storage, Drainage or Collection Systems

Sumps, cisterns, catch basins and/or dry wells

A sump is located in southeast section of the plating room, next to the former wastewater treatment system. The sump was used to capture the spilled solution from the plating tanks, which was then pumped to the waste water treatment system. The water from the sump is piped into the wastewater treatment facility where the metals are filtered out of the water. Treated water is then discharged into the sanitary sewer system. Based on the age of the sump (~40 years) compromises to the system are possible; therefore, the presence of the sump and wastewater treatment system is part of the long-term industrial use REC noted for this property.

Electrical Transformers/PCBs

Transformers and/or capacitors

During Terracon's site visit, three pole-mounted transformers, owned and serviced by PacifiCrop, were observed on the northern property boundary; however, no information with regard to PCB content of the transformer fluids was observed. Some transformers contain mineral oil which may contain PCBs.

PacifiCrop, maintains responsibility for the transformers, and if the transformers were "PCB contaminated," utility PacifiCrop, is not required to replace the transformer fluids until a release is identified. However, evidence of current or prior releases was not observed in the vicinity of the electrical equipment during the site reconnaissance.

Releases or Potential Releases

Stained pavement or similar surfaces

Staining was observed in the plating room section of the site. Based on the amount of staining, duration of operations and poor condition of the pavement, the stained pavement represents an REC to the site.

Dumping or disposal areas

During the site inspection in 2015, Mr. Schovaer mentioned to Terracon that in the early 1980s etchant was visibly seeping out of the building's southern exterior wall. Historically, a loading platform for the rail spur that entered the property was present along the southern wall. Due to this, the concrete slab for the building is elevated approximately three feet from ground surface. Due to the visible seepage in the early 1980s, Mr. Schovaers installed a floor lining in the plating room. The extent of the release is unknown. The known release of the etchant with its associated metals is part of the long-term industrial use REC noted for this property.

6.0 ADJOINING PROPERTY RECONNAISSANCE

Visual observations of adjoining properties (from site boundaries) are summarized below.

Adjoining Properties

Direction	Description
North	Crown Plating (8 and 14 South Jeremy Street) adjoins the site to the north
East	Jeremy Street and Heritage Forge Inc. (15 South Jeremy Street) adjoins the site to the east
South	Liberty Auto Work (42 South Jeremy Street) adjoins the site to the south, across the former railroad tracks
West	EPC International Warehouse (25 South 900 West) adjoins the site to the west

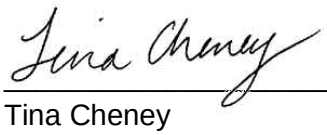
RECs were not observed with the adjoining properties.

7.0 ADDITIONAL SERVICES

Per the agreed scope of services specified in the proposal, additional services (e.g. asbestos sampling, lead-based paint sampling, wetlands evaluation, lead in drinking water testing, radon testing, vapor encroachment screening, etc.) were not conducted.

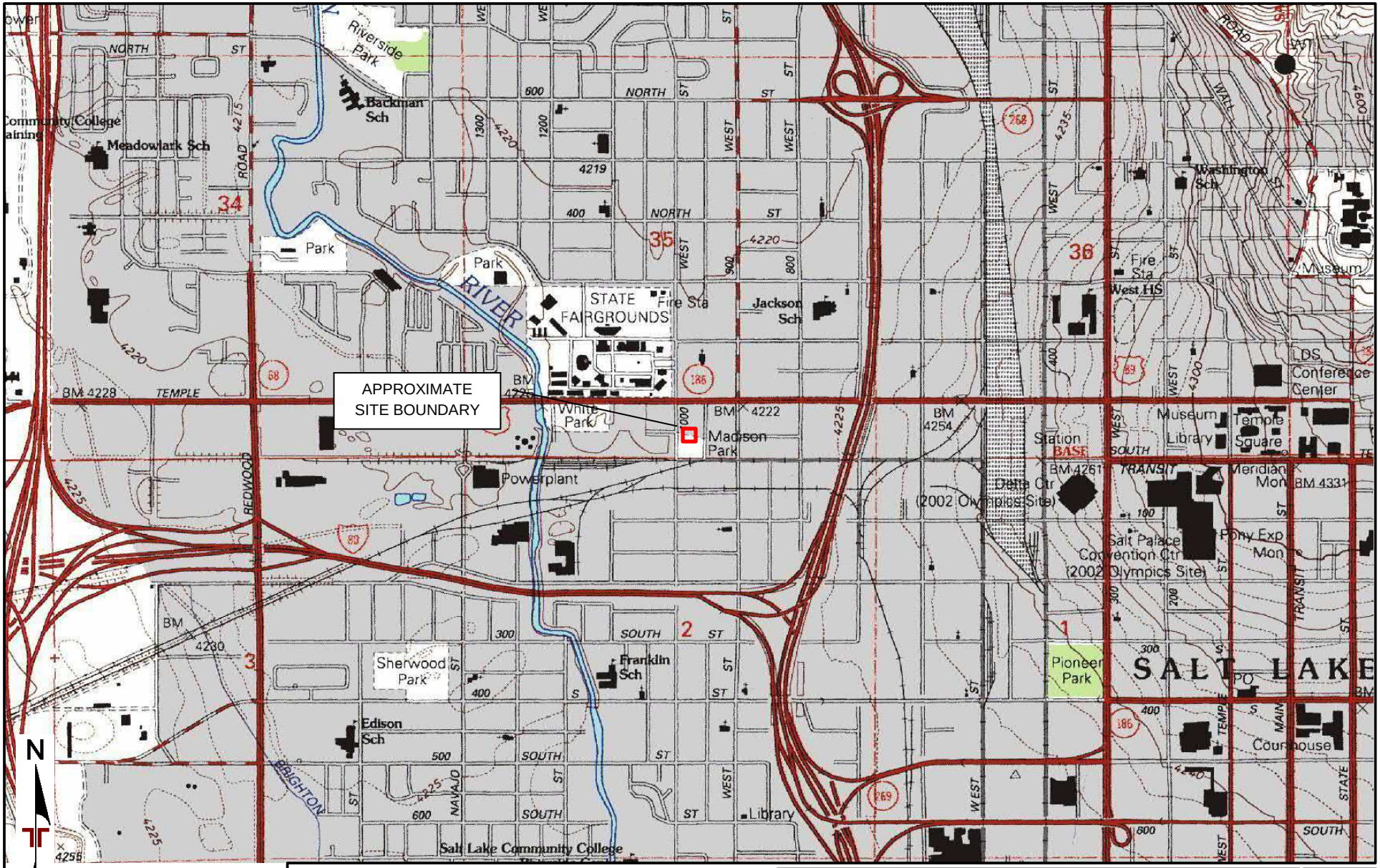
8.0 DECLARATION

I, Tina Cheney, declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in Section 312.10 of 40 CFR 312; and I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the site. I have developed and performed the All Appropriate Inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.



Tina Cheney
ESA Group Manager

APPENDIX A
EXHIBIT 1 – TOPOGRAPHIC MAP
EXHIBIT 2 – SITE DIAGRAM



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY QUADRANGLES INCLUDE: SALT LAKE CITY NORTH, UT (1/1/1998).

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	TC
Drawn by:	TC
Checked by:	BB
Approved by:	BB

Project No.	61177082.L
Scale:	1"=2,000'
File Name:	Ex. 1&2
Date:	Dec. 2017

Terracon
6949 S High Tech Dr Ste 100
Midvale, UT 84047-3707

TOPOGRAPHIC MAP

Schovaers Electronics
22 South Jeremy Street
Salt Lake City, UT

Exhibit
1

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	TC
Drawn by:	TC
Checked by:	BB
Approved by:	BB

Project No.	61177082.L
Scale:	AS SHOWN
File Name:	Ex. 1&2
Date:	Dec. 2017

Terracon
6949 S High Tech Dr Ste 100
Midvale, UT 84047-3707

SITE DIAGRAM

Schovaers Electronics
22 South Jeremy Street
Salt Lake City, UT

Exhibit

2

APPENDIX B
SITE PHOTOGRAPHS

Site Photographs
Schovaers Elecronics ■ Salt Lake City, Utah
Date Photos were taken: December 13, 2017 ■ Terracon Project No. 61177082.L

Photo #1 View of the site, from the southeast corner, looking west.

Photo #2 North side of the site, looking west.

Photo #3 View of the access to test the wastewater going to the municipal system in the general room.

Photo #4 View of the sump, in the area of the former waste water treatment area.

Photo #5 View of the former Plate Shop, staining observed throughout.

Photo #6 View of the former drill room.

Photo #7 View of the former hot air vent in the general area.

Photo #8 Area of former drum storage.

Photo #9 View of the air compressor shed on the north side of the building.

Photo #10 Air compressor, staining observed.

Photo #11 West side of the site – vacant land.

Photo #12 View of the boat in the shed at the northwest corner of the site.

Photo #13 North-adjoining Crown Plating.

Photo #14 East-adjoining Jeremy Street, followed by Heritage Forge, stone yard.

Photo #15 South-adjoining former railroad tracks and auto-repair facilities.

Photo #16 South-adjoining former railroad tracks and auto-repair facilities.

Photo #17 West-adjoining EPC Warehouse.

APPENDIX C
HISTORICAL DOCUMENTATION AND USER QUESTIONNAIRE

Client/User Required Questionnaire

Terracon

Person Completing Questionnaire	Name: Rudigan Matthes Company: Salt Lake County	Phone: 385-468-4868 Email: RMatthes@slco.org
Site Name	Schovaers Electronics	
Site Address	225 Jeremy St. SLC, UT [redacted]	
Point of Contact for Access	Name: ~~Justin Bellis~~ Bob Schovaers Company: Schovaers Electronics	Phone: 801 943 3569 Email: bonschovaers@aol.com
Access Restrictions or Special Site Requirements?	X No ___Yes (If yes, please explain)	
Confidentiality Requirements?	X No ___Yes (If yes, please explain)	
Current Site Owner	Name: Bob Schovaers Company: Schovaers Electronics	Phone: 801 943 3569 Email: bonschovaers@aol.com
Current Site Operator	Name: Company: Vacant	Phone: Email:
Reasons for ESA (e.g., financing, acquisition, lease, etc.)	Acquisition	
Anticipated Future Site Use	Undetermined	
Relevant Documents?	Please provide Terracon copies of prior Phase I or II ESAs, Asbestos Surveys, Environmental Permits or Audit documents, Underground Storage Tank documents, Geotechnical Investigations, Site Surveys, Diagrams or Maps, or other relevant reports or documents.	

ASTM User Questionnaire

In order to qualify for one of the Landowner Liability Protections (LLPs) offered by the Small Business Relief and Brownfields Revitalization Act of 2001 (the "Brownfields Amendments"), the user must respond to the following questions. Failure to provide this information to the environmental professional may result in significant data gaps, which may limit our ability to identify recognized environmental conditions resulting in a determination that "all appropriate inquiry" is not complete. This form represents a type of interview and as such, the user has an obligation to answer all questions in good faith, to the extent of their actual knowledge.

1) Did a search of recorded land title records (or judicial records where appropriate) identify any environmental liens filed or recorded against the property under federal, tribal, state, or local law (40 CFR 312.25)?
X No ___Yes ___Title search not completed (If yes, explain below and send Terracon a copy of the Chain of Title report.)

2) Did a search of recorded land title records (or judicial records where appropriate) identify any activity and use limitations (AULs), such as engineering controls, land use restrictions, or institutional controls that are in place at the property and/or have been filed or recorded against the property under federal, tribal, state, or local law (40 CFR 312.26)?
X No ___Yes ___Title search not completed (If yes, explain below and send Terracon a copy of the Chain of Title report.)

3) Do you have any specialized knowledge or experience related to the site or nearby properties? For example, are you involved in the same line of business as the current or former occupants of the site or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business (40 CFR 312-28)?
X No ___Yes (If yes, explain below)

4) Do you have actual knowledge of a lower purchase price because contamination is known or believed to be present at the site (40 CFR 312.29)?
X No ___Yes ___Not applicable (If yes, explain below)

5) Are you aware of commonly known or reasonably ascertainable information about the site that would help the environmental professional to identify conditions indicative of releases or threatened releases (40 CFR 312.30)?
___No X Yes (If yes, explain below) Phase II ESA (2015)

6) Based on your knowledge and experience related to the site, are there any obvious indicators that point to the presence or likely presence of contamination at the site (40 CFR 312.31)?
___No X Yes (If yes, explain below)

Comments or explanations:
Phase II suggested contamination.

Client/User Required Questionnaire

Terracon

Person Completing Questionnaire	Name: Company: Euclid, LC	Phone: 801-244-9703 Email: justin.bellivean@gmail.com
Site Name	Schoenens Electronics	
Site Address	22 South Jeremy Street	
Point of Contact for Access	Name: Bob Schoenens Company: Party of 6 LLC	Phone: 801-943-3569 Email: bobschoenens@aol.com
Access Restrictions or Special Site Requirements?	✓No ___Yes (If yes, please explain)	
Confidentiality Requirements?	✓No ___Yes (If yes, please explain)	
Current Site Owner	Name: Party of 6, LLC Company: Bob Schoenens	Phone: Email:
Current Site Operator	Name: Company: Vacant	Phone: Email:
Reasons for ESA (e.g., financing, acquisition, lease, etc.)	Acquisition	
Anticipated Future Site Use	Adaptive Reuse or demo + new construction	
Relevant Documents?	Please provide Terracon copies of prior Phase I or II ESAs, Asbestos Surveys, Environmental Permits or Audit documents, Underground Storage Tank documents, Geotechnical Investigations, Site Surveys, Diagrams or Maps, or other relevant reports or documents.	

ASTM User Questionnaire

In order to qualify for one of the Landowner Liability Protections (LLPs) offered by the Small Business Relief and Brownfields Revitalization Act of 2001 (the "Brownfields Amendments"), the user must respond to the following questions. Failure to provide this information to the environmental professional may result in significant data gaps, which may limit our ability to identify recognized environmental conditions resulting in a determination that "all appropriate inquiry" is not complete. This form represents a type of interview and as such, the user has an obligation to answer all questions in good faith, to the extent of their actual knowledge.

1) Did a search of recorded land title records (or judicial records where appropriate) identify any environmental liens filed or recorded against the property under federal, tribal, state, or local law (40 CFR 312.25)?
✓No ___Yes ___Title search not completed (If yes, explain below and send Terracon a copy of the Chain of Title report.)

2) Did a search of recorded land title records (or judicial records where appropriate) identify any activity and use limitations (AULs), such as engineering controls, land use restrictions, or institutional controls that are in place at the property and/or have been filed or recorded against the property under federal, tribal, state, or local law (40 CFR 312.26)?
✓No ___Yes ___Title search not completed (If yes, explain below and send Terracon a copy of the Chain of Title report.)

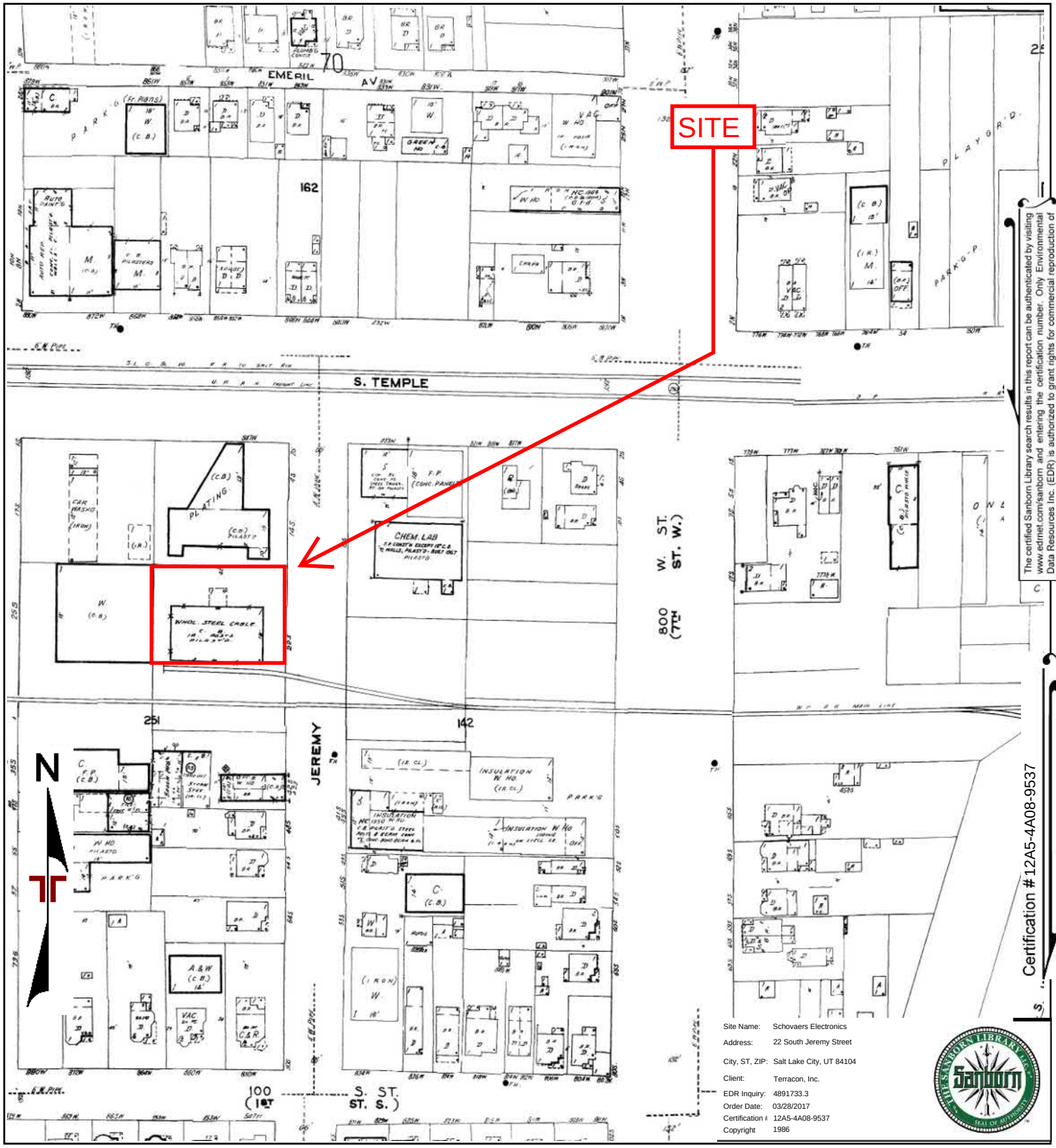
3) Do you have any specialized knowledge or experience related to the site or nearby properties? For example, are you involved in the same line of business as the current or former occupants of the site or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business (40 CFR 312-28)?
✓No ___Yes (If yes, explain below)

4) Do you have actual knowledge of a lower purchase price because contamination is known or believed to be present at the site (40 CFR 312.29)?
✓No ___Yes ___Not applicable (If yes, explain below)

5) Are you aware of commonly known or reasonably ascertainable information about the site that would help the environmental professional to identify conditions indicative of releases or threatened releases (40 CFR 312.30)?
✓No ___Yes (If yes, explain below)

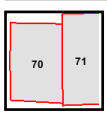
6) Based on your knowledge and experience related to the site, are there any obvious indicators that point to the presence or likely presence of contamination at the site (40 CFR 312.31)?
___No ✓Yes (If yes, explain below)

Comments or explanations: Phase II ESA previously conducted by Terracon, Inc. on 2/8/16



Certification # 12A5-4A08-9537

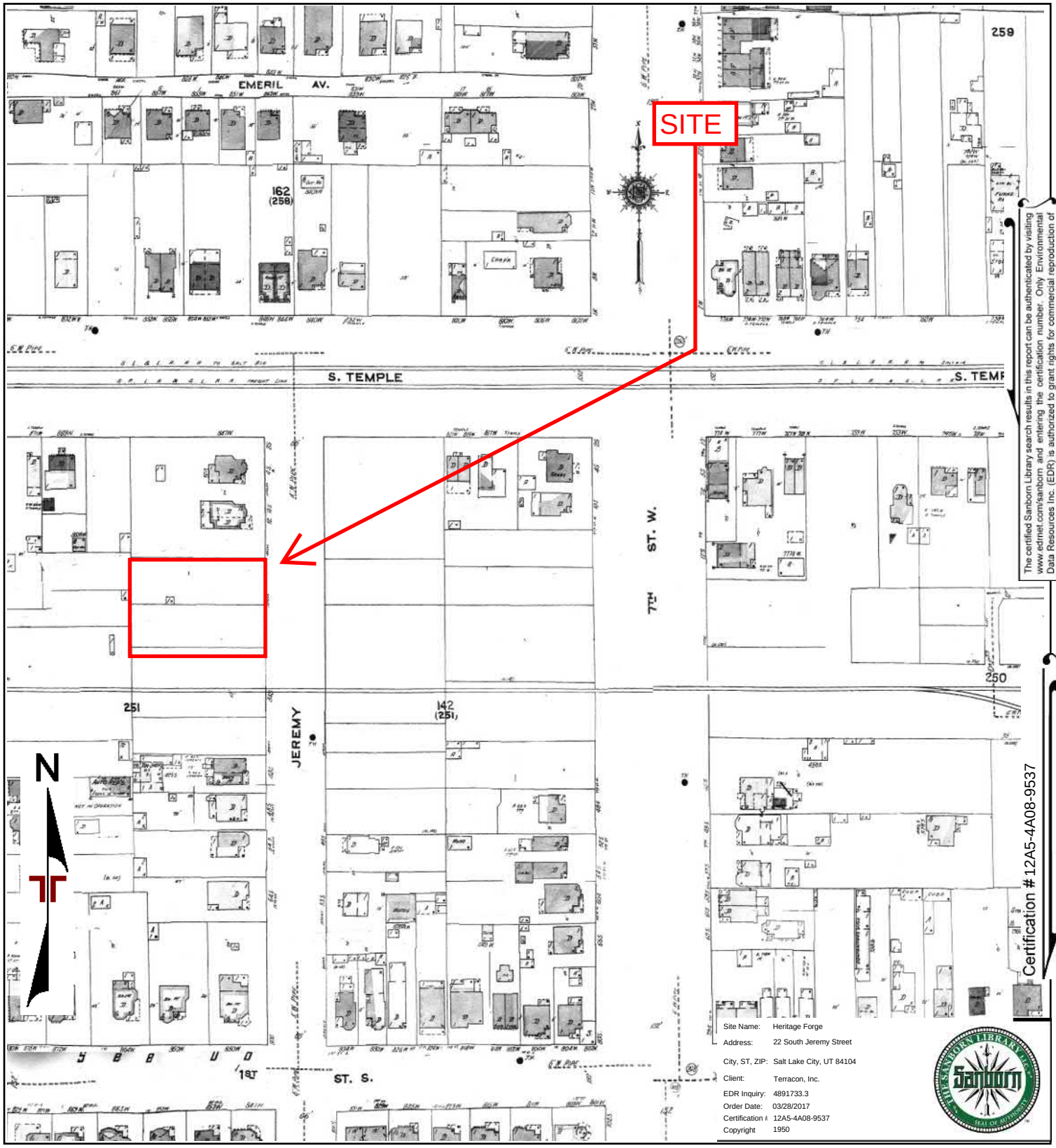
Site Name:	Schovaers Electronics
Address:	22 South Jeremy Street
City, ST, ZIP:	Salt Lake City, UT 84104
Client:	Terracon, Inc.
EDR Inquiry:	4891733.3
Order Date:	03/28/2017
Certification #	12A5-4A08-9537
Copyright	1986



Volume 1, Sheet 71
Volume 1, Sheet 70

0 Feet 150 300 600

Project Manager:	Project No.	Terracon 6949 South High Tech Drive Midvale, UT 84047	1986 SANBORN MAP Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	Appendix C
Drawn by:	Scale: As Shown			
Checked by:	File Name:			
Approved by:	Date: 1986			



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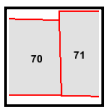
Certification # 12A5-4A08-9537

Site Name:	Heritage Forge
Address:	22 South Jeremy Street
City, ST, ZIP:	Salt Lake City, UT 84104
Client:	Terracon, Inc.
EDR Inquiry:	4891733.3
Order Date:	03/28/2017
Certification #	12A5-4A08-9537
Copyright	1950

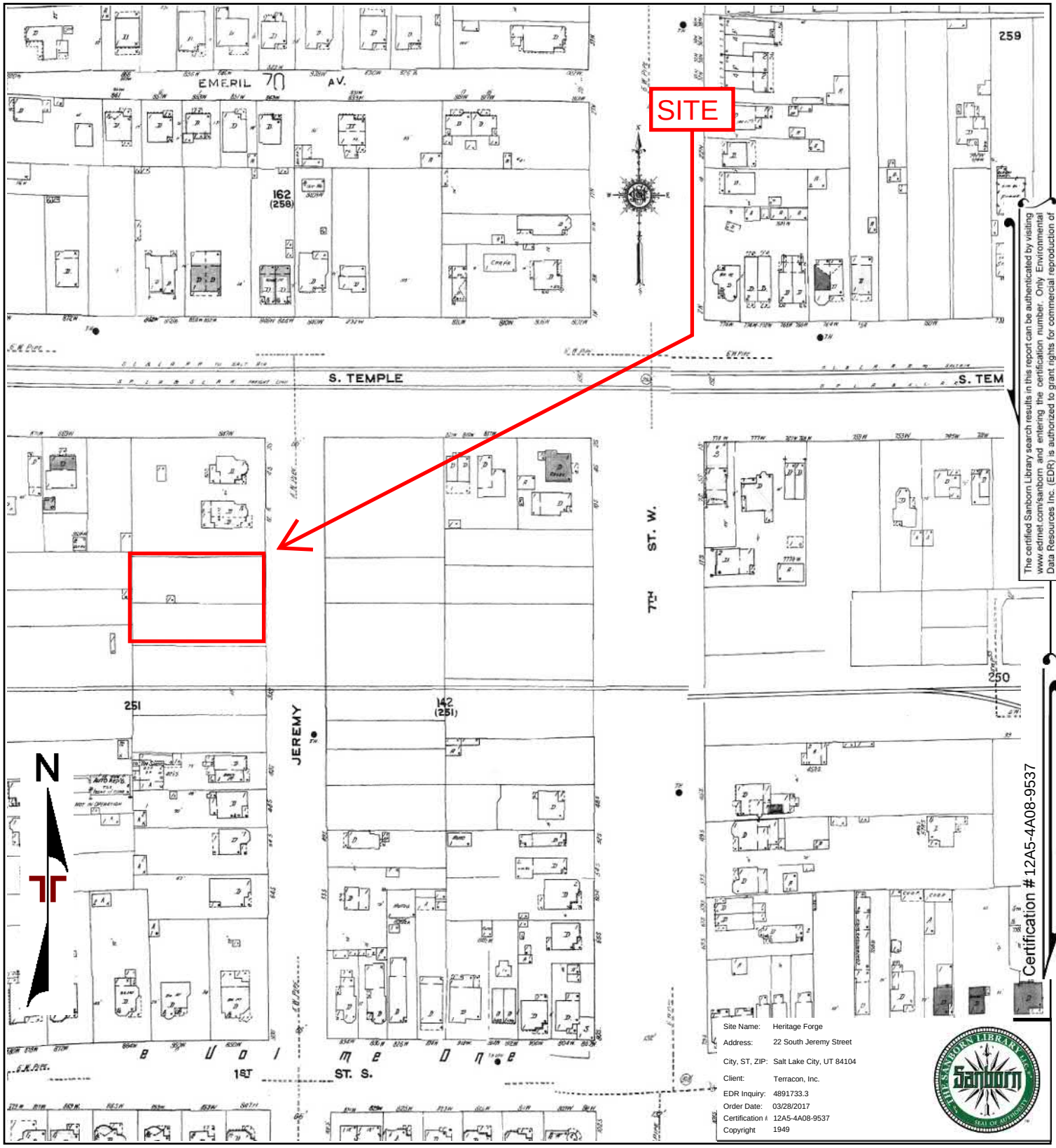


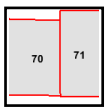
Volume 1, Sheet 71
Volume 1, Sheet 70

0 Feet 150 300 600

Project Manager:	Project No.	Terracon 6949 South High Tech Drive Midvale, UT 84047	1950 SANBORN MAP Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 1950		

Appendix C

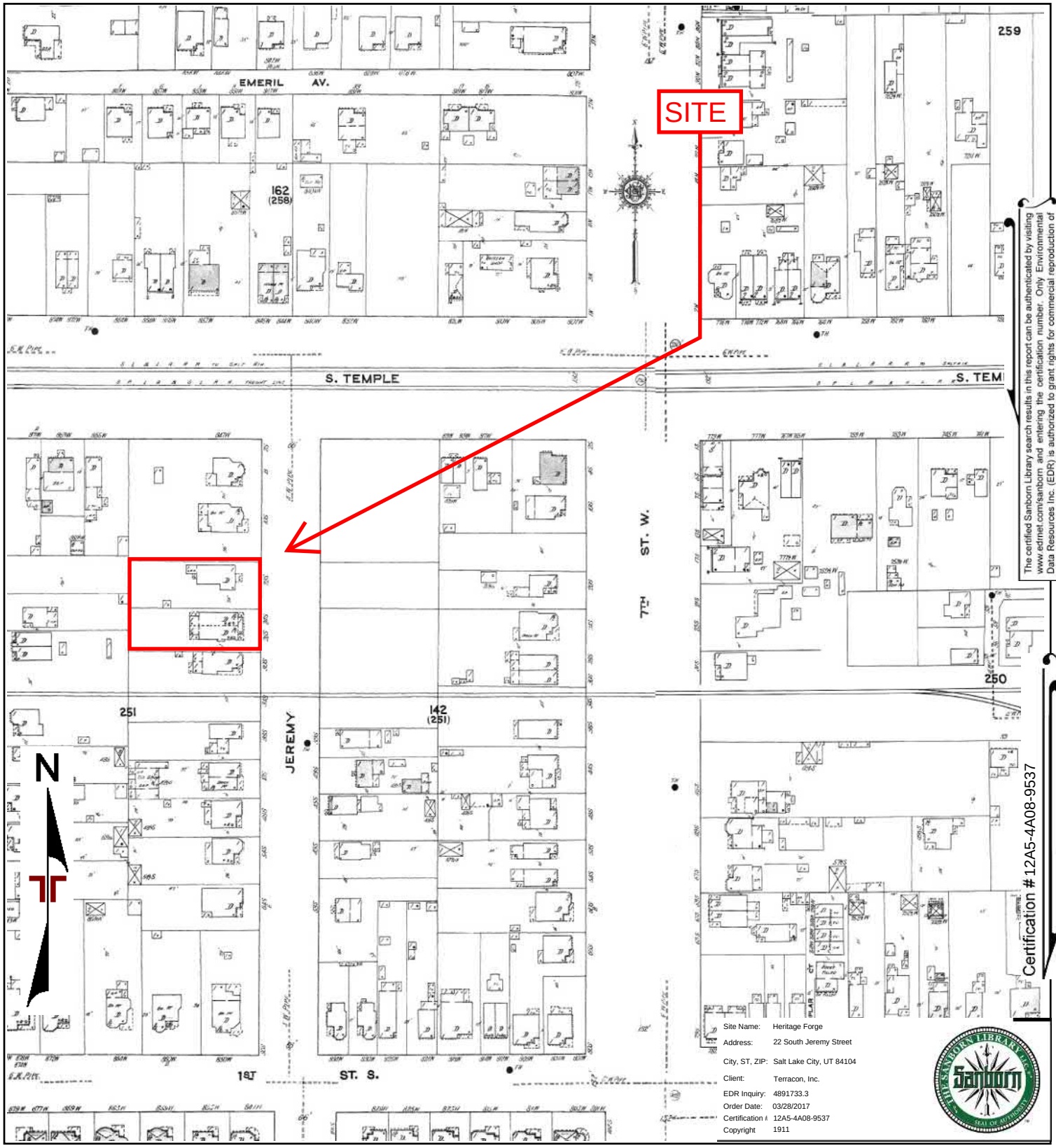


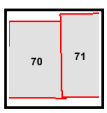


Volume 1, Sheet 71
Volume 1, Sheet 70

0 Feet 150 300 600

Project Manager:	Project No.	Terracon 6949 South High Tech Drive Midvale, UT 84047	1949 SANBORN MAP Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	Appendix C
Drawn by:	Scale: As Shown			
Checked by:	File Name:			
Approved by:	Date: 1949			

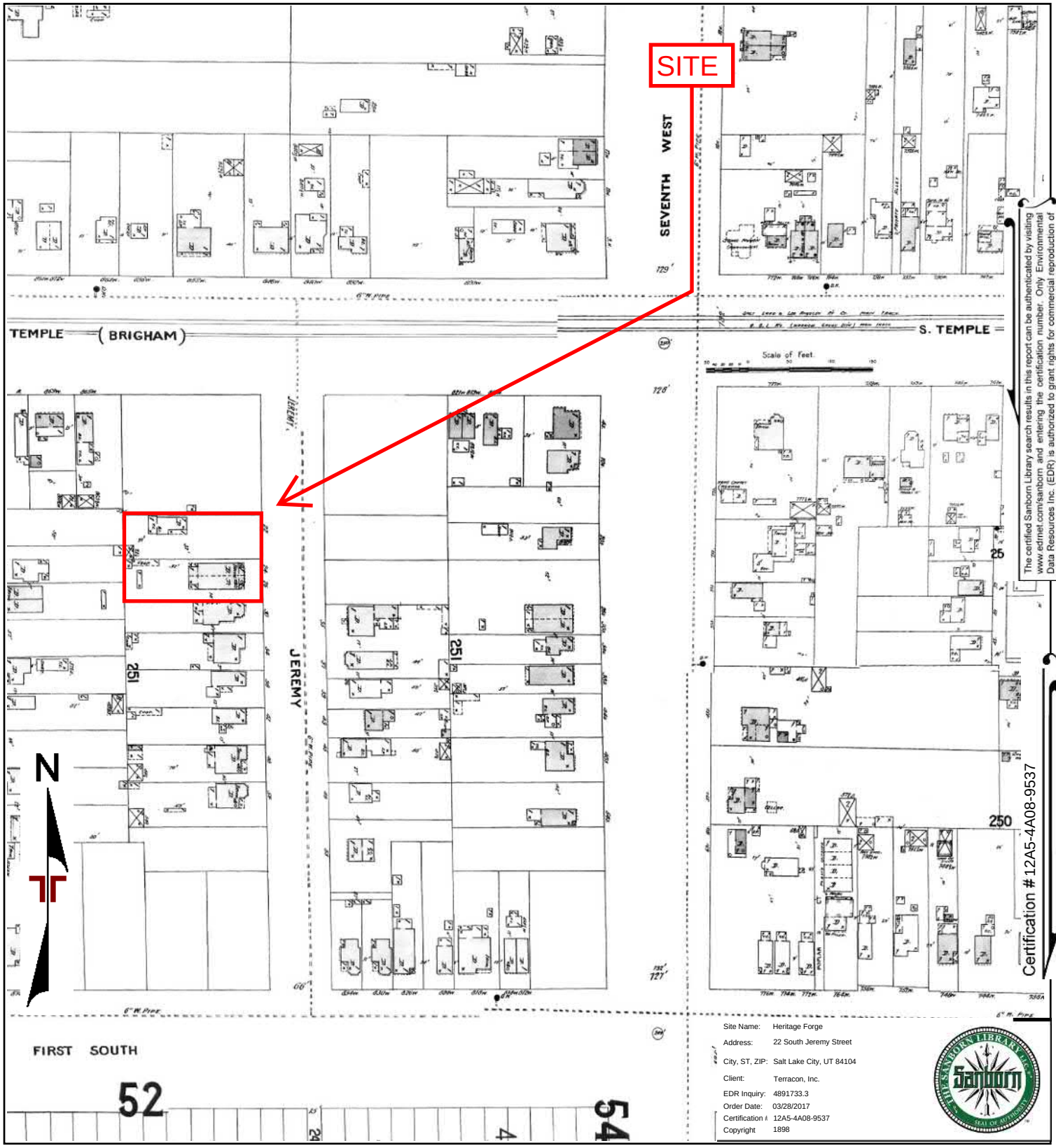


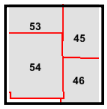


Volume 1, Sheet 71
Volume 1, Sheet 70

0 Feet 150 300 600

Project Manager:	Project No.	Terracon 6949 South High Tech Drive Midvale, UT 84047	1911 SANBORN MAP Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	Appendix C
Drawn by:	Scale: As Shown			
Checked by:	File Name:			
Approved by:	Date: 1911			

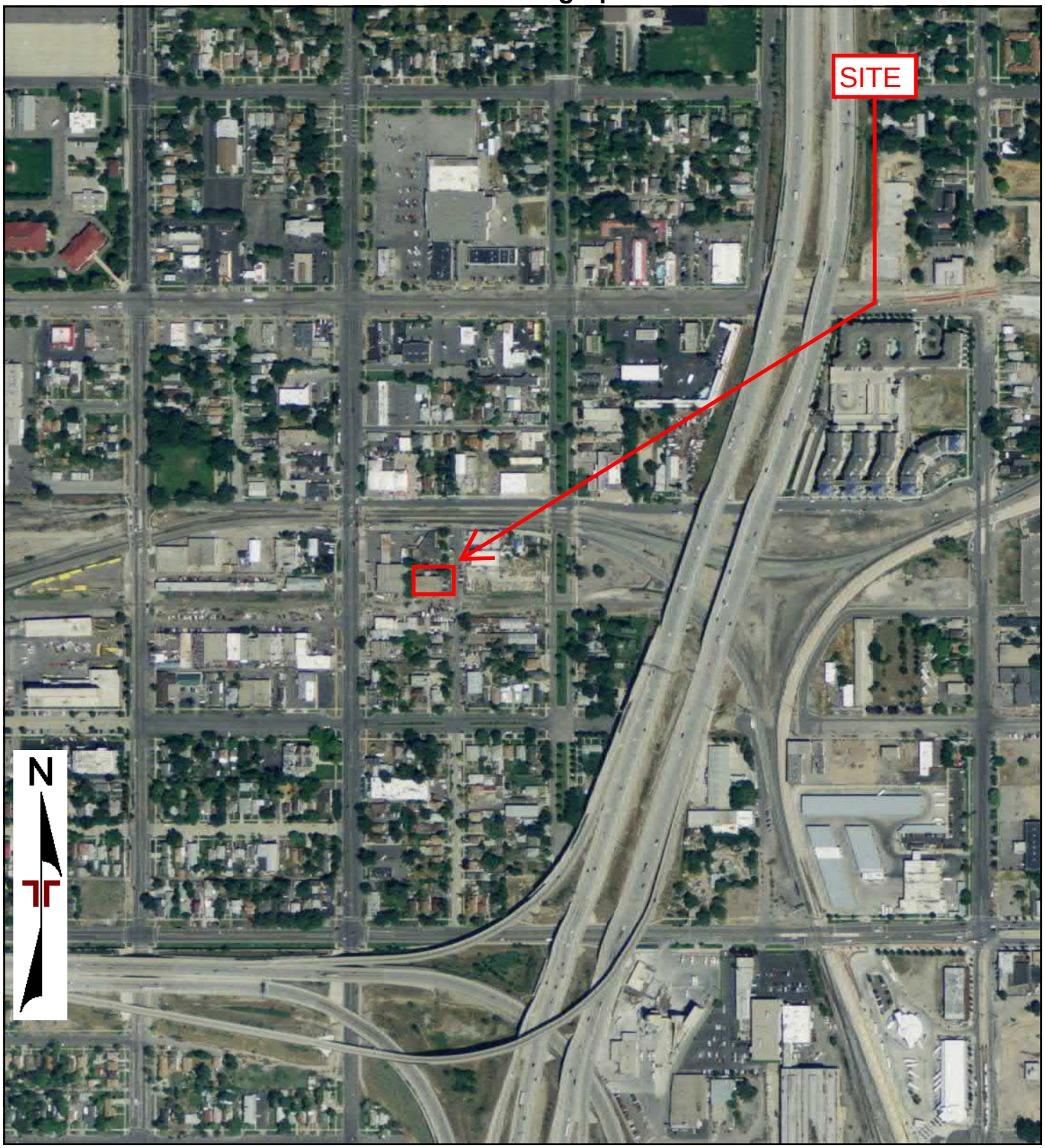




Volume 1, Sheet 54
Volume 1, Sheet 53
Volume 1, Sheet 46
Volume 1, Sheet 45

0 Feet 150 300 600

Project Manager:	Project No.	Terracon 6949 South High Tech Drive Midvale, UT 84047	1898 SANBORN MAP Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	Appendix
Drawn by:	Scale: As Shown			C
Checked by:	File Name:			
Approved by:	Date: 1898			



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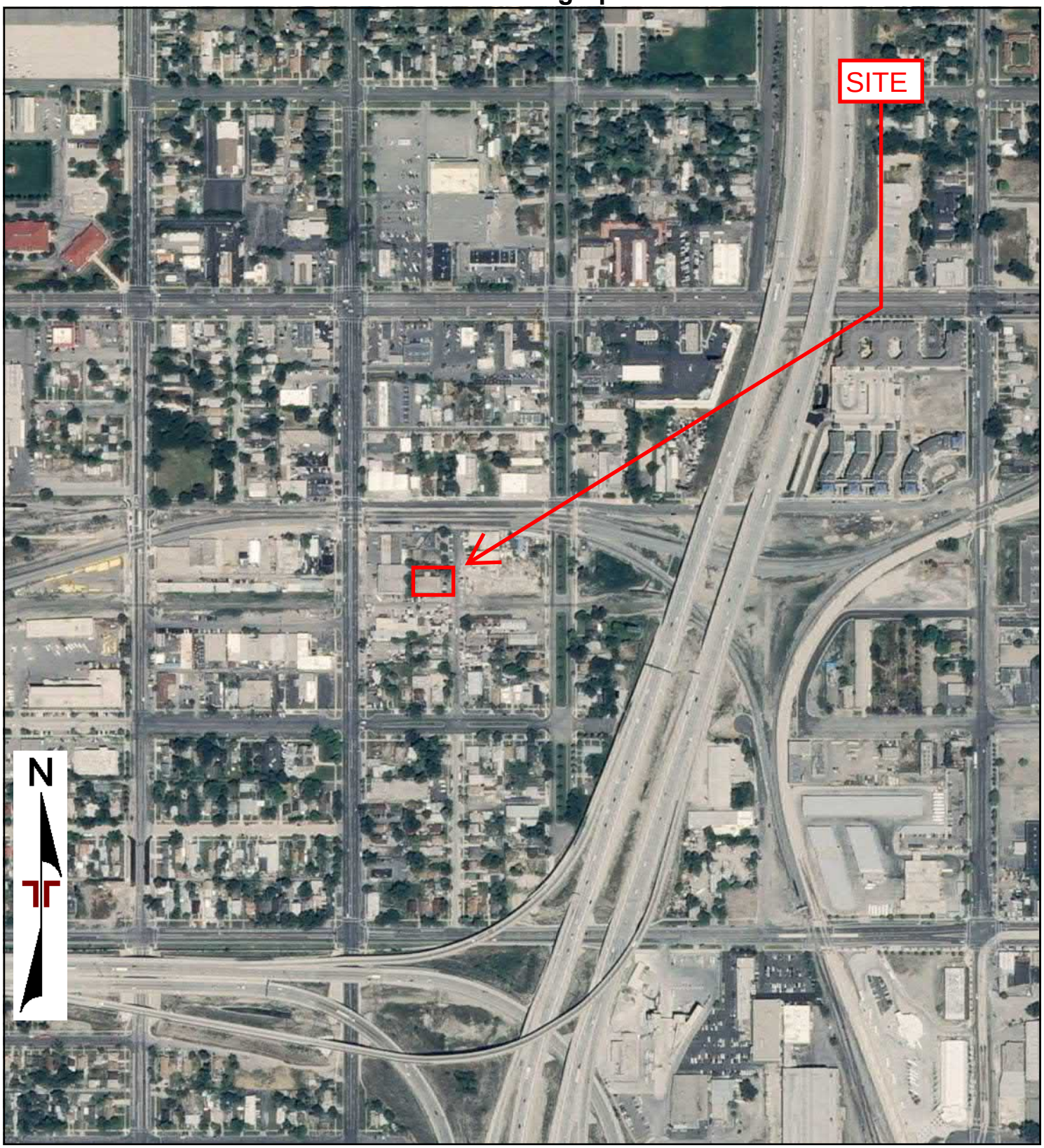
Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	2011 AERIAL PHOTOGRAPH	Appendix
Drawn by:	Scale: As Shown		Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	C
Checked by:	File Name:			
Approved by:	Date: 2011			



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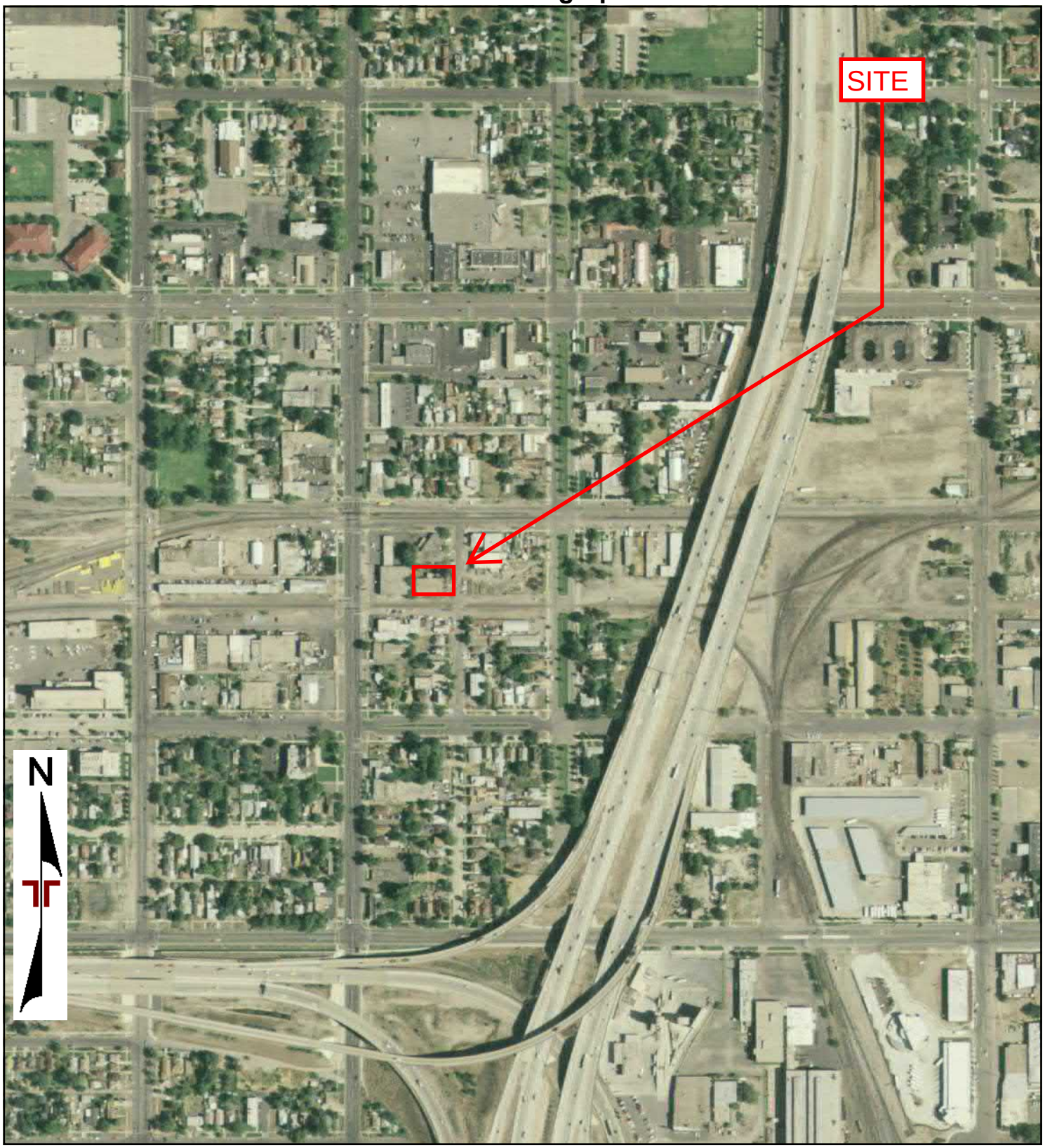
Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	2009 AERIAL PHOTOGRAPH Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	Appendix C
Drawn by:	Scale: As Shown			
Checked by:	File Name:			
Approved by:	Date: 2009			



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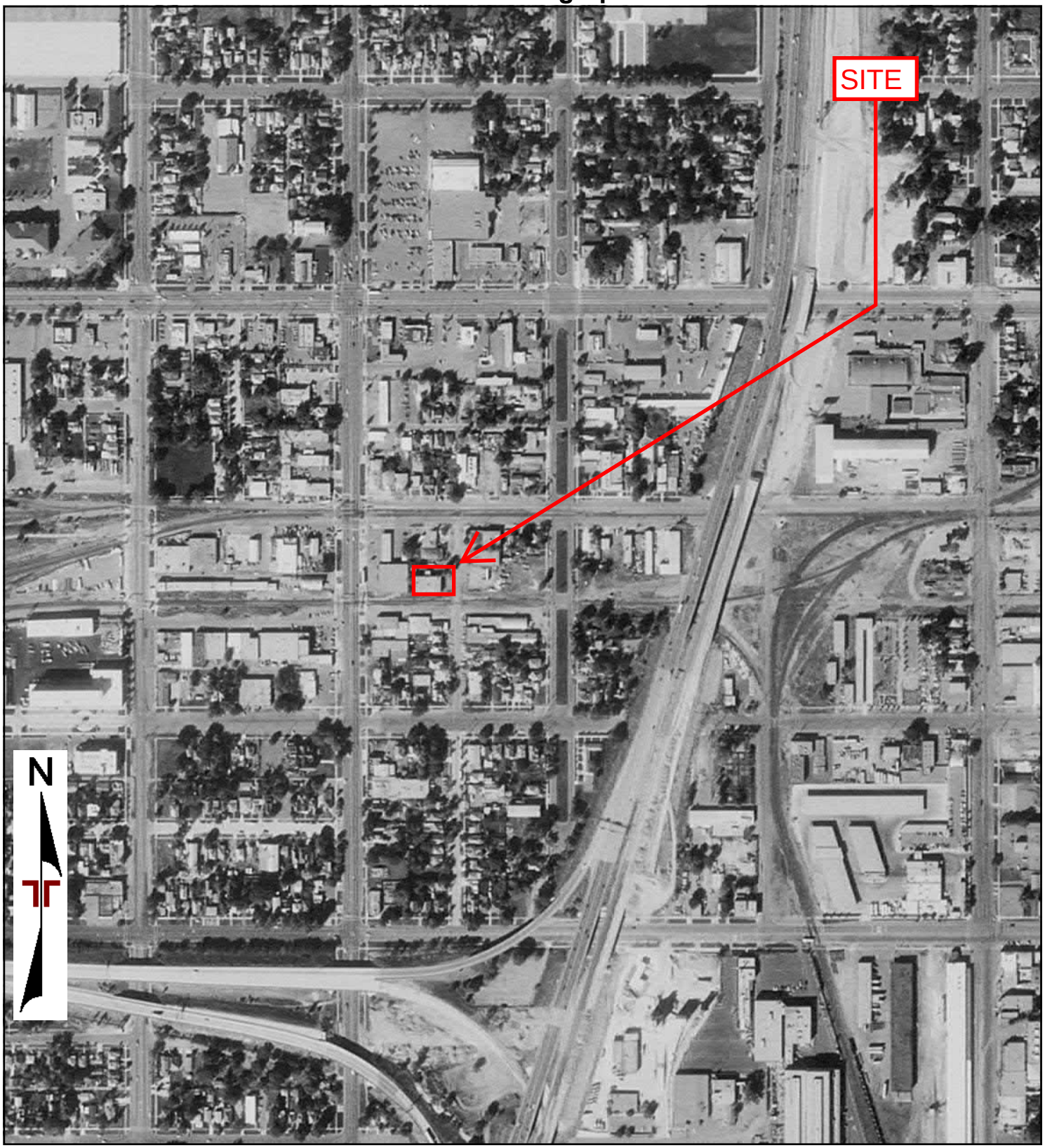
Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	2006 AERIAL PHOTOGRAPH Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	Appendix C
Drawn by:	Scale: As Shown			
Checked by:	File Name:			
Approved by:	Date: 2006			



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Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1997 AERIAL PHOTOGRAPH	Appendix
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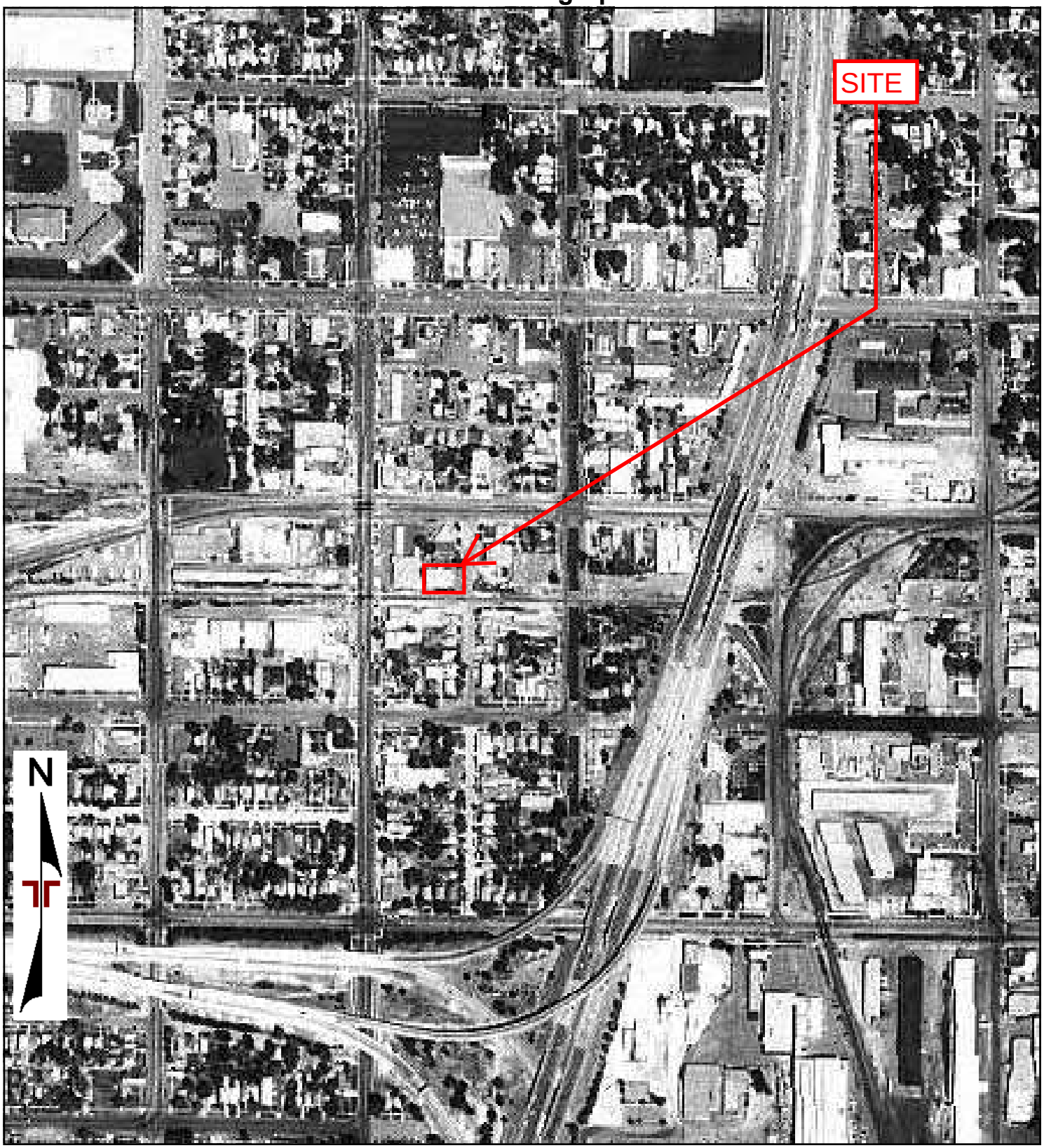
Checked by:	File Name:			
Approved by:	Date: 1997			



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Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1993 AERIAL PHOTOGRAPH	Appendix
Drawn by:	Scale: As Shown		Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	C
Checked by:	File Name:			
Approved by:	Date: 1993			

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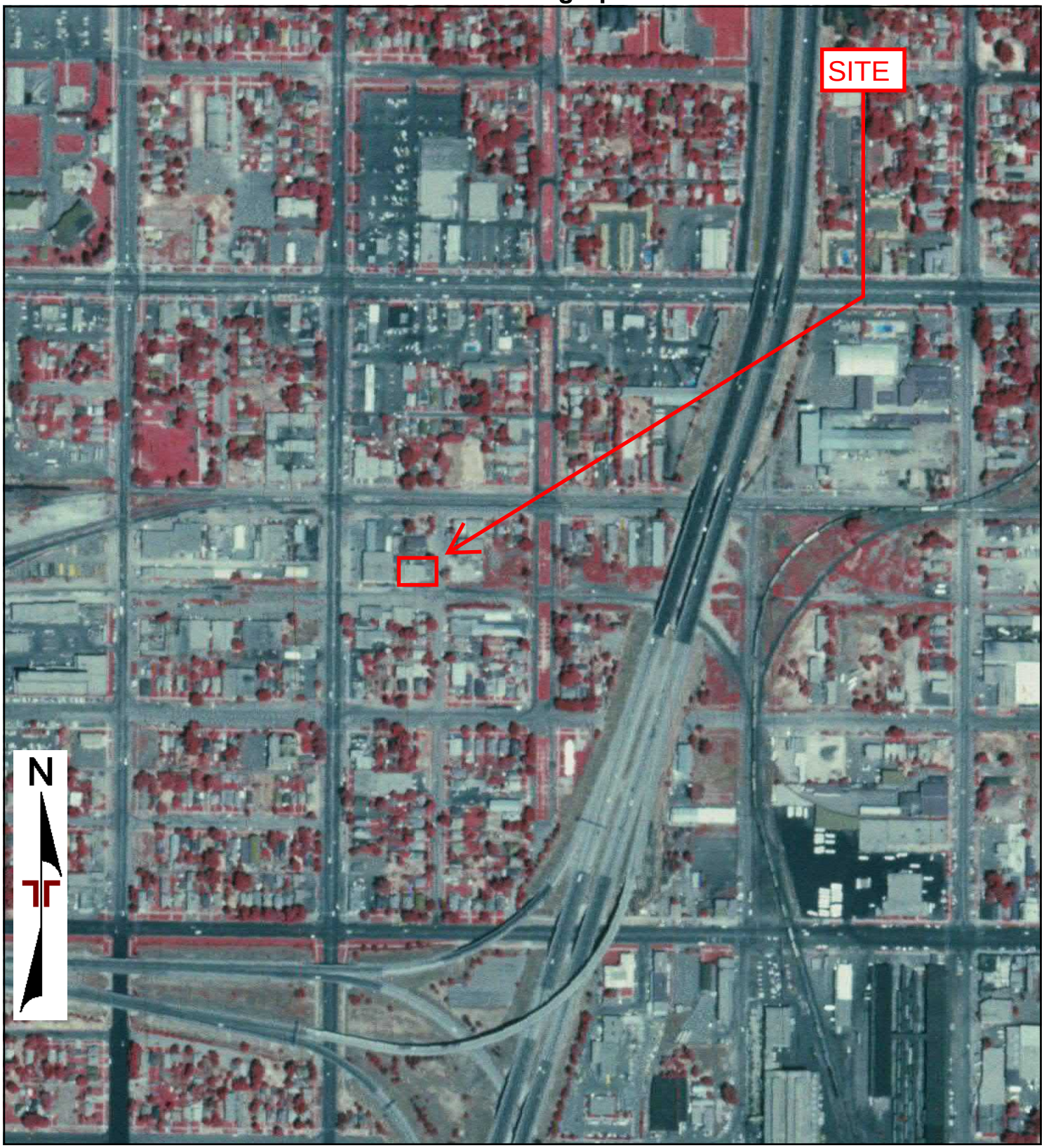
Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1987 AERIAL PHOTOGRAPH Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 1987		

Appendix C



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Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1981 AERIAL PHOTOGRAPH	Appendix
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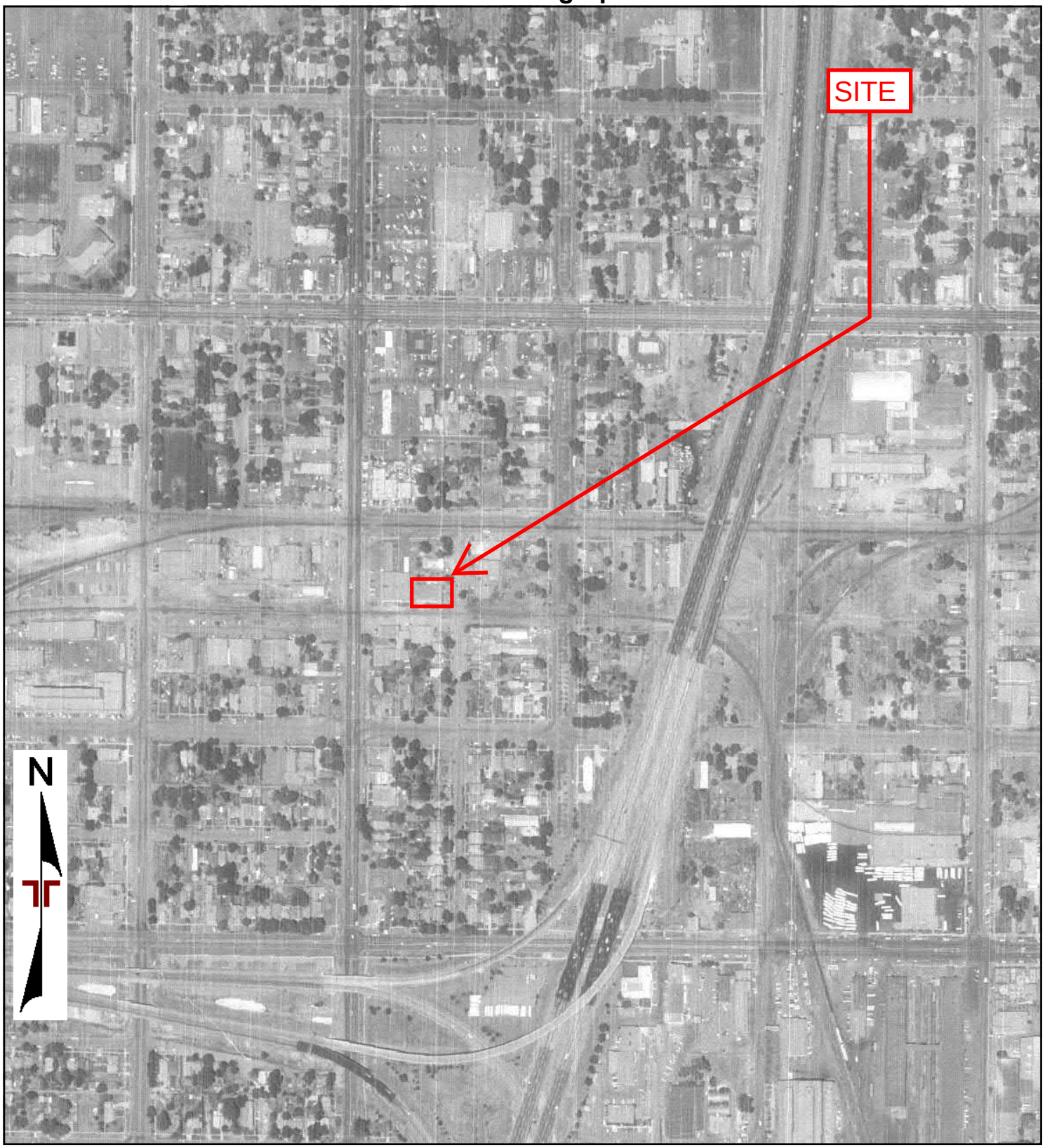
Checked by:	File Name:			
Approved by:	Date: 1981			



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Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1977 AERIAL PHOTOGRAPH	Appendix
Drawn by:	Scale: As Shown		Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	C
Checked by:	File Name:			
Approved by:	Date: 1977			

0 Feet 500 1000 2000

Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1971 AERIAL PHOTOGRAPH	Appendix
Drawn by:	Scale: As Shown		Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	C
Checked by:	File Name:			
Approved by:	Date: 1971			

0 Feet 500 1000 2000

Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1965 AERIAL PHOTOGRAPH Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	Appendix C
Drawn by:	Scale: As Shown			
Checked by:	File Name:			
Approved by:	Date: 1965			

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Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1962 AERIAL PHOTOGRAPH	Appendix
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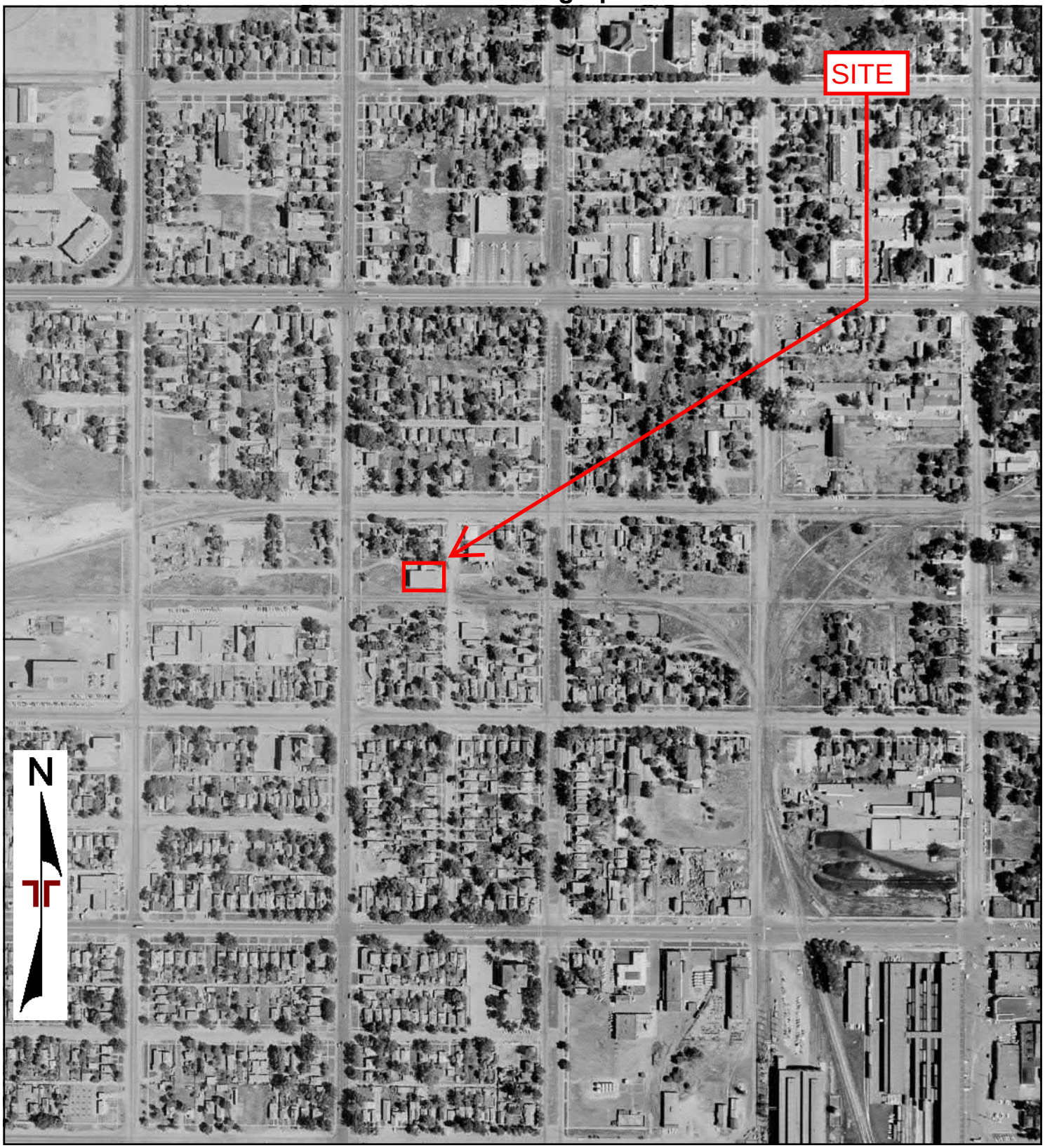
Checked by:	File Name:			
Approved by:	Date: 1962			

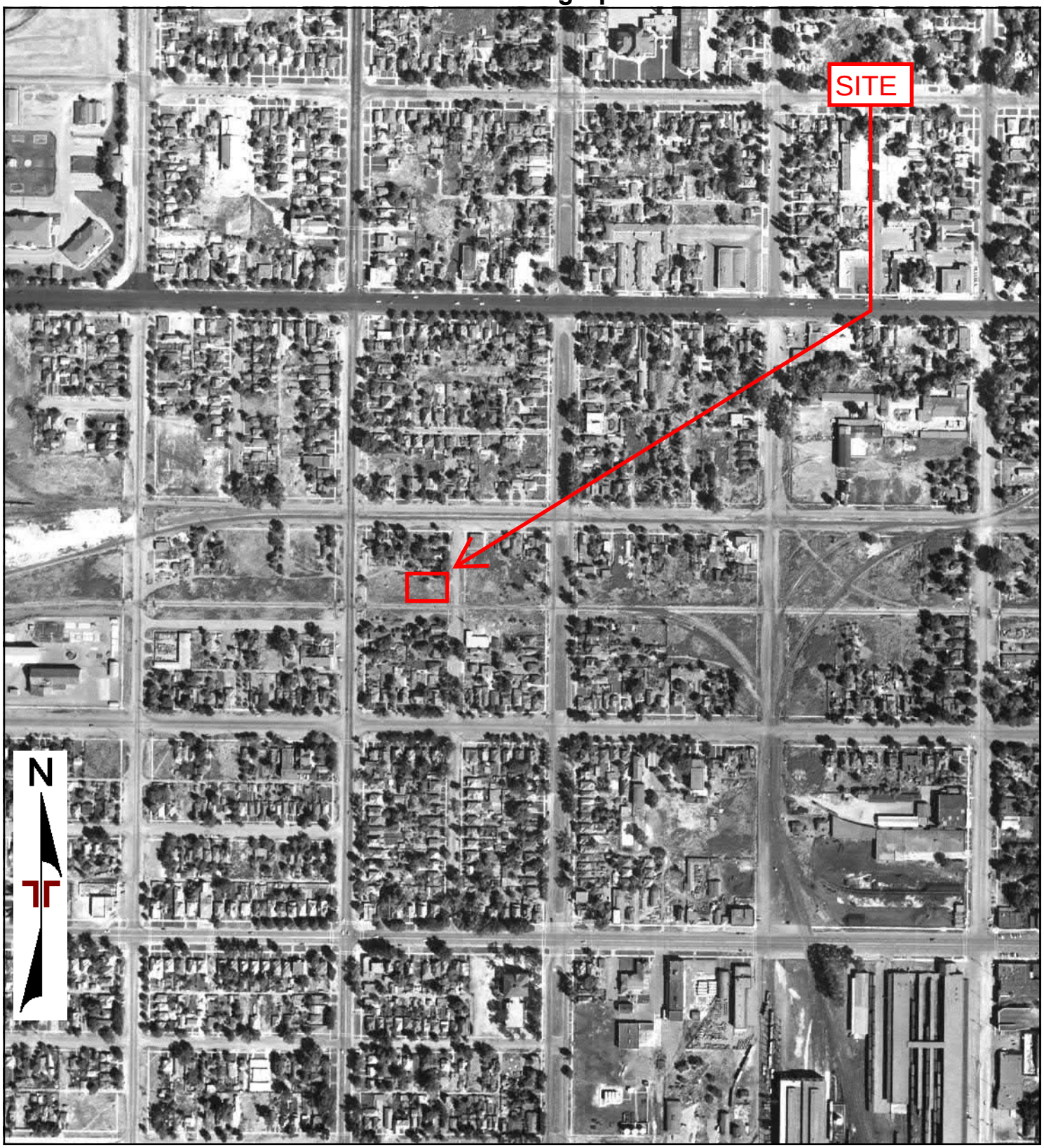


6949 South High Tech Drive

Midvale, UT 84047

0 Feet 500 1000 2000

Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1958 AERIAL PHOTOGRAPH Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104
Drawn by:	Scale: As Shown		Appendix C
Checked by:	File Name:		
Approved by:	Date: 1958		



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Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1952 AERIAL PHOTOGRAPH	Appendix
Drawn by:	Scale: As Shown		Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	C
Checked by:	File Name:			
Approved by:	Date: 1952			

0 Feet 500 1000 2000

Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1946 AERIAL PHOTOGRAPH	Appendix
Drawn by:	Scale: As Shown		Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	C
Checked by:	File Name:			
Approved by:	Date: 1946			

0 Feet 500 1000 2000

Project Manager:	Project No. 61177082	Terracon 6949 South High Tech Drive Midvale, UT 84047	1937 AERIAL PHOTOGRAPH	Appendix
Drawn by:	Scale: As Shown		Schovaers Electronics 22 South Jeremy Street Salt Lake City, UT 84104	C
Checked by:	File Name:			
Approved by:	Date: 1937			

DATE: 12-12-2017

TINA CHENEY

TERRACON

6949 S. HIGH TECH DRIVE, SUITE 100

MIDVALE, UT 84047

61177082

TEXAS ENVIRONMENTAL RESEARCH

126 SCEPTRE DRIVE
ROCKWALL, TEXAS 75032

TEL: (972) 772-4283
FAX: (972) 772-4283

ENVIRONMENTAL AND OTHER ACTIVITY AND USE LIMITATION

(AUL) SEARCH

THE ATTACHED REPORT IS BEING PROVIDED TO APPLICANT SOLELY FOR THE PURPOSE OF FACILITATING LANDOWNER OR PURCHASE DEFENSES WHICH MAY BE AVAILABLE UNDER THE LIABILITY ACT OF 1980, AS AMENDED. IT IS PROVIDED FOR THE SOLE USE AND BENEFIT OF APPLICANT AND MAY NOT BE USED OR RELIED UPON BY ANY OTHER PARTY FOR ANY REASON.

NOTE: THIS SEARCH REPRESENTS SURFACE CONVEYANCES ONLY. TOTAL LIABILITY OF TEXAS ENVIRONMENTAL RESEARCH COMPANY IS LIMITED TO THE AMOUNT PAID FOR THIS REPORT.

THIS REPORT WAS PREPARED FOR THE PURPOSE OF ASSISTING IN AN ENVIRONMENTAL HAZARD INSPECTION OF THE FOLLOWING DESCRIBED PROPERTY.

LEGAL DESCRIPTION: PARCEL: 15122040070000, 22 SOUTH JEREMY STREET, SALT LAKE COUNTY, SALT LAKE CITY, UTAH.

CURRENT OWNER: PARTY OF SIX L.L.C.

DATE : JUNE 26, 2017

INSTRUMENT: WARRANTY DEED

GRANTOR : SCHOVAERS ELECTRONICS CORPORATION

GRANTEE : PARTY OF SIX L.L.C.

FILE NO. : 651928

DATE : JUNE 5, 1977

INSTRUMENT: WARRANTY DEED

GRANTOR : HERBERT R. BALLINGER, TRUSTEE

GRANTEE : SCHOVAERS ELECTRONICS CORPORATION

FILE NO. : 945762

DATE : JANUARY 19, 1977

INSTRUMENT: WARRANTY DEED

GRANTOR : WREN OWEN AND SPOUSE, SANDRA OWEN

GRANTEE : HERBERT R. BALLINGER, TRUSTEE

FILE NO. : 382953

DATE : AUGUST 25, 1970

INSTRUMENT: WARRANTY DEED

GRANTOR : OTIS L. DRYDEN AND SPOUSE, JUDITH DRYDEN

GRANTEE : WREN OWEN AND SPOUSE, SANDRA OWEN

FILE NO. : 143769

DATE : APRIL 23, 1965

INSTRUMENT: WARRANTY DEED

GRANTOR : CHAD RAUSCHER

GRANTEE : OTIS L. DRYDEN AND SPOUSE, JUDITH DRYDEN

FILE NO. : 752618

DATE : MARCH 19, 1956

INSTRUMENT: WARRANTY DEED

GRANTOR : LOUIS A. KURYLAND

GRANTEE : CHAD RAUSCHER

FILE NO. : 651439

DATE : NOVEMBER 4, 1950

INSTRUMENT: WARRANTY DEED

GRANTOR : DILLON H. WINFIELD

GRANTEE : LOUIS A. KURYLAND

FILE NO. : 213875

DATE : JANUARY 25, 1946

INSTRUMENT: WARRANTY DEED

GRANTOR : FRANCIS P. HADLOCK, ET AL

GRANTEE : DILLON H. WINFIELD

FILE NO. : 142961

DATE : MAY 18, 1939

INSTRUMENT: WARRANTY DEED

GRANTOR : ALLEN F. NUNNALLY AND SPOUSE, CAROL NUNNALLY

GRANTEE : FRANCIS P. HADLOCK, ET AL

FILE NO. : 753819

EASEMENTS : UTILITY EASEMENT.

Prepared by Texas Environmental Research on 12-12-2017.

ENVIRONMENTAL LIEN AND OTHER ACTIVITY AND USE LIMITATIONS SEARCH

AFTER COMPLETING AN ENVIRONMENTAL LIEN AND OTHER ACTIVITY AND USE LIMITATIONS SEARCH A FINDING THAT NO ENVIRONMENTAL LIENS OR AUL'S HAVE BEEN FILED OF PUBLIC RECORD AND THAT IT HAS BEEN DETERMINED THAT THE PROPERTY RESEARCHED IN THIS REPORT COMPLIES WITH ASTM E 1527-13-SEC. 8.3.4.4 AND SECTION 6.2

THIS REPORT MEETS OR EXCEEDS A.S.T.M. E 1527-13.

APPENDIX D
ENVIRONMENTAL DATABASE INFORMATION

GeoSearch
On time. On target. In touch.™

Radius Report

Satellite view

Target Property:

Schovaers Electronics
22 Jeremy St
Salt Lake City, Salt Lake County, Utah 84104

Prepared For:

Terracon Consultants-Salt Lake City

Order #: 98336
Job #: 215459
Project #: 61177082
Date: 12/15/2017

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Disclaimer

This report was designed by GeoSearch to meet or exceed the records search requirements of the All Appropriate Inquiries Rule (40 CFR §312.26) and the current version of the ASTM International E1527, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process or, if applicable, the custom requirements requested by the entity that ordered this report. The records and databases of records used to compile this report were collected from various federal,state and local governmental entities. It is the goal of GeoSearch to meet or exceed the 40 CFR §312.26 and E1527 requirements for updating records by using the best available technology. GeoSearch contacts the appropriate governmental entities on a recurring basis. Depending on the frequency with which a record source or database of records is updated by the governmental entity, the data used to prepare this report may be updated monthly, quarterly, semi-annually, or annually.

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Target Property Summary

Target Property Information

Schovaers Electronics
22 Jeremy St
Salt Lake City, Utah 84104

Coordinates
Area centroid (-111.91574, 40.7686468)
4,226 feet above sea level

USGS Quadrangle
Salt Lake City North, UT

Geographic Coverage Information

County/Parish: Salt Lake (UT)
ZipCode(s):
Salt Lake City UT: 84101, 84103, 84104, 84116

Radon
* Target property is located in Radon Zone 2.
Zone 2 areas have a predicted average indoor radon screening level between 2 and 4 pCi/L (picocuries per liter).

Database Summary

FEDERAL LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
EMERGENCY RESPONSE NOTIFICATION SYSTEM	ERNSUT	1	0	TP/AP
FEDERAL ENGINEERING INSTITUTIONAL CONTROL SITES	EC	0	0	TP/AP
LAND USE CONTROL INFORMATION SYSTEM	LUCIS	0	0	TP/AP
RCRA SITES WITH CONTROLS	RCRASC	0	0	TP/AP
RESOURCE CONSERVATION & RECOVERY ACT - GENERATOR	RCRAGR08	3	0	0.1250
RESOURCE CONSERVATION & RECOVERY ACT - NON-GENERATOR	RCRANGR08	1	0	0.1250
FEMA OWNED STORAGE TANKS	FEMAUST	0	0	0.2500
BROWNFIELDS MANAGEMENT SYSTEM	BF	10	0	0.5000
DELISTED NATIONAL PRIORITIES LIST	DNPL	0	0	0.5000
NO LONGER REGULATED RCRA NON-CORRACTS TSD FACILITIES	NLRRCRAT	0	0	0.5000
RESOURCE CONSERVATION & RECOVERY ACT - NON-CORRACTS TREATMENT, STORAGE & DISPOSAL FACILITIES	RCRAT	1	0	0.5000
SUPERFUND ENTERPRISE MANAGEMENT SYSTEM	SEMS	1	0	0.5000
SUPERFUND ENTERPRISE MANAGEMENT SYSTEM ARCHIVED SITE INVENTORY	SEMSARCH	4	0	0.5000
NATIONAL PRIORITIES LIST	NPL	1	0	1.0000
NO LONGER REGULATED RCRA CORRECTIVE ACTION FACILITIES	NLRRCRAC	0	0	1.0000
PROPOSED NATIONAL PRIORITIES LIST	PNPL	0	0	1.0000
RESOURCE CONSERVATION & RECOVERY ACT - CORRECTIVE ACTION FACILITIES	RCRAC	1	0	1.0000
RESOURCE CONSERVATION & RECOVERY ACT - SUBJECT TO CORRECTIVE ACTION FACILITIES	RCRASUBC	1	0	1.0000

SUB-TOTAL		24	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
AEROMETRIC INFORMATION RETRIEVAL SYSTEM / AIR FACILITY SUBSYSTEM	AIRSAFS	1	0	TP/AP
BIENNIAL REPORTING SYSTEM	BRS	1	0	TP/AP
CERCLIS LIENS	SFLIENS	0	0	TP/AP
CLANDESTINE DRUG LABORATORY LOCATIONS	CDL	0	0	TP/AP
EPA DOCKET DATA	DOCKETS	1	0	TP/AP
ENFORCEMENT AND COMPLIANCE HISTORY INFORMATION	ECHOR08	4	0	TP/AP

Database Summary

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
FACILITY REGISTRY SYSTEM	FRSUT	11	0	TP/AP
HAZARDOUS MATERIALS INCIDENT REPORTING SYSTEM	HMIRSR08	0	0	TP/AP
INTEGRATED COMPLIANCE INFORMATION SYSTEM (FORMERLY DOCKETS)	ICIS	1	0	TP/AP
INTEGRATED COMPLIANCE INFORMATION SYSTEM NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM	ICISNPDES	3	0	TP/AP
MATERIAL LICENSING TRACKING SYSTEM	MLTS	0	0	TP/AP
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM	NPDESR08	1	0	TP/AP
PCB ACTIVITY DATABASE SYSTEM	PADS	0	0	TP/AP
PERMIT COMPLIANCE SYSTEM	PCSR08	0	0	TP/AP
SEMS LIEN ON PROPERTY	SEMSLIENS	0	0	TP/AP
SECTION SEVEN TRACKING SYSTEM	SSTS	0	0	TP/AP
TOXIC SUBSTANCE CONTROL ACT INVENTORY	TSCA	0	0	TP/AP
TOXICS RELEASE INVENTORY	TRI	0	0	TP/AP
ALTERNATIVE FUELING STATIONS	ALTFUELS	1	0	0.2500
HISTORICAL GAS STATIONS	HISTPST	0	0	0.2500
INTEGRATED COMPLIANCE INFORMATION SYSTEM DRYCLEANERS	ICISCLEANERS	0	0	0.2500
MINE SAFETY AND HEALTH ADMINISTRATION MASTER INDEX FILE	MSHA	0	0	0.2500
MINERAL RESOURCE DATA SYSTEM	MRDS	0	0	0.2500
OPEN DUMP INVENTORY	ODI	0	0	0.5000
SURFACE MINING CONTROL AND RECLAMATION ACT SITES	SMCRA	0	0	0.5000
URANIUM MILL TAILINGS RADIATION CONTROL ACT SITES	USUMTRCA	0	0	0.5000
DEPARTMENT OF DEFENSE SITES	DOD	0	0	1.0000
FORMER MILITARY NIKE MISSILE SITES	NMS	0	0	1.0000
FORMERLY USED DEFENSE SITES	FUDS	0	0	1.0000
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM	FUSRAP	0	0	1.0000
RECORD OF DECISION SYSTEM	RODS	1	0	1.0000
SUB-TOTAL		25	0	

Database Summary

STATE (UT) LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
INSTITUTIONAL ENGINEERING CONTROLS REGISTRY	ICEC	0	0	TP/AP
REGISTERED UNDERGROUND STORAGE TANKS	RUST	14	0	0.2500
BROWNFIELD PROPERTIES	BF	1	0	0.5000
CERCLIS SITES	CERCLIS	5	0	0.5000
LANDFILL AND SOLID WASTE DISPOSAL SITES	LFSWDS	0	0	0.5000
LEAKING UNDERGROUND STORAGE TANKS	LUST	24	0	0.5000
VOLUNTARY CLEANUP PROGRAM SITES	VCP	2	0	0.5000
NATIONAL PRIORITIES LIST	NPL	1	0	1.0000
SUB-TOTAL		47	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
SALT LAKE COUNTY CLANDESTINE DRUG LABORATORY	SLCCDL	0	0	TP/AP
TIER II FACILITIES	TIERII	0	0	TP/AP
SUB-TOTAL		0	0	

Database Summary

TRIBAL LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
UNDERGROUND STORAGE TANKS ON TRIBAL LANDS	USTR08	0	0	0.2500
LEAKING UNDERGROUND STORAGE TANKS ON TRIBAL LANDS	LUSTR08	0	0	0.5000
OPEN DUMP INVENTORY ON TRIBAL LANDS	ODINDIAN	0	0	0.5000
SUB-TOTAL		0	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
INDIAN RESERVATIONS	INDIANRES	0	0	1.0000
SUB-TOTAL		0	0	

TOTAL		96	0	

Database Radius Summary

FEDERAL LISTING

*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
AIRSAFS	0.0200	1	NS	NS	NS	NS	NS	1
BRS	0.0200	1	NS	NS	NS	NS	NS	1
CDL	0.0200	0	NS	NS	NS	NS	NS	0
DOCKETS	0.0200	1	NS	NS	NS	NS	NS	1
EC	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
ECHOR08	0.0200	4	NS	NS	NS	NS	NS	4
ERNSUT	**0.0200**	**1**	**NS**	**NS**	**NS**	**NS**	**NS**	**1**
FRSUT	0.0200	11	NS	NS	NS	NS	NS	11
HMIRSR08	0.0200	0	NS	NS	NS	NS	NS	0
ICIS	0.0200	1	NS	NS	NS	NS	NS	1
ICISNPDES	0.0200	3	NS	NS	NS	NS	NS	3
LUCIS	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
MLTS	0.0200	0	NS	NS	NS	NS	NS	0
NPDESR08	0.0200	1	NS	NS	NS	NS	NS	1
PADS	0.0200	0	NS	NS	NS	NS	NS	0
PCSR08	0.0200	0	NS	NS	NS	NS	NS	0
RCRASC	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
SEMSLIENS	0.0200	0	NS	NS	NS	NS	NS	0
SFLIENS	0.0200	0	NS	NS	NS	NS	NS	0
SSTS	0.0200	0	NS	NS	NS	NS	NS	0
TRI	0.0200	0	NS	NS	NS	NS	NS	0
TSCA	0.0200	0	NS	NS	NS	NS	NS	0
RCRAGR08	**0.1250**	**2**	**1**	**NS**	**NS**	**NS**	**NS**	**3**
RCRANGR08	**0.1250**	**1**	**0**	**NS**	**NS**	**NS**	**NS**	**1**
ALTFUELS	0.2500	0	0	1	NS	NS	NS	1
FEMAUST	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
HISTPST	0.2500	0	0	0	NS	NS	NS	0
ICISCLEANERS	0.2500	0	0	0	NS	NS	NS	0
MRDS	0.2500	0	0	0	NS	NS	NS	0
MSHA	0.2500	0	0	0	NS	NS	NS	0
BF	**0.5000**	**5**	**1**	**3**	**1**	**NS**	**NS**	**10**
DNPL	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
NLRRCRAT	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
ODI	0.5000	0	0	0	0	NS	NS	0
RCRAT	**0.5000**	**0**	**0**	**0**	**1**	**NS**	**NS**	**1**

Database Radius Summary

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
SEMS	**0.5000**	**0**	**0**	**0**	**1**	**NS**	**NS**	**1**
SEMSARCH	**0.5000**	**0**	**1**	**0**	**3**	**NS**	**NS**	**4**
SMCRA	0.5000	0	0	0	0	NS	NS	0
USUMTRCA	0.5000	0	0	0	0	NS	NS	0
DOD	1.0000	0	0	0	0	0	NS	0
FUDS	1.0000	0	0	0	0	0	NS	0
FUSRAP	1.0000	0	0	0	0	0	NS	0
NLRRCRAC	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
NMS	1.0000	0	0	0	0	0	NS	0
NPL	**1.0000**	**0**	**0**	**0**	**1**	**0**	**NS**	**1**
PNPL	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
RCRAC	**1.0000**	**0**	**0**	**0**	**1**	**0**	**NS**	**1**
RCRASUBC	**1.0000**	**0**	**0**	**0**	**1**	**0**	**NS**	**1**
RODS	1.0000	0	0	0	1	0	NS	1
SUB-TOTAL		32	3	4	10	0	0	49

Database Radius Summary

STATE (UT) LISTING

*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
ICEC	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
SLCCDL	0.0200	0	NS	NS	NS	NS	NS	0
TIERII	0.0200	0	NS	NS	NS	NS	NS	0
RUST	**0.2500**	**1**	**4**	**9**	**NS**	**NS**	**NS**	**14**
BF	**0.5000**	**0**	**0**	**1**	**0**	**NS**	**NS**	**1**
CERCLIS	**0.5000**	**0**	**1**	**0**	**4**	**NS**	**NS**	**5**
LFSWDS	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
LUST	**0.5000**	**0**	**3**	**8**	**13**	**NS**	**NS**	**24**
VCP	**0.5000**	**0**	**0**	**0**	**2**	**NS**	**NS**	**2**
NPL	**1.0000**	**0**	**0**	**0**	**1**	**0**	**NS**	**1**
SUB-TOTAL		1	8	18	20	0	0	47

Database Radius Summary

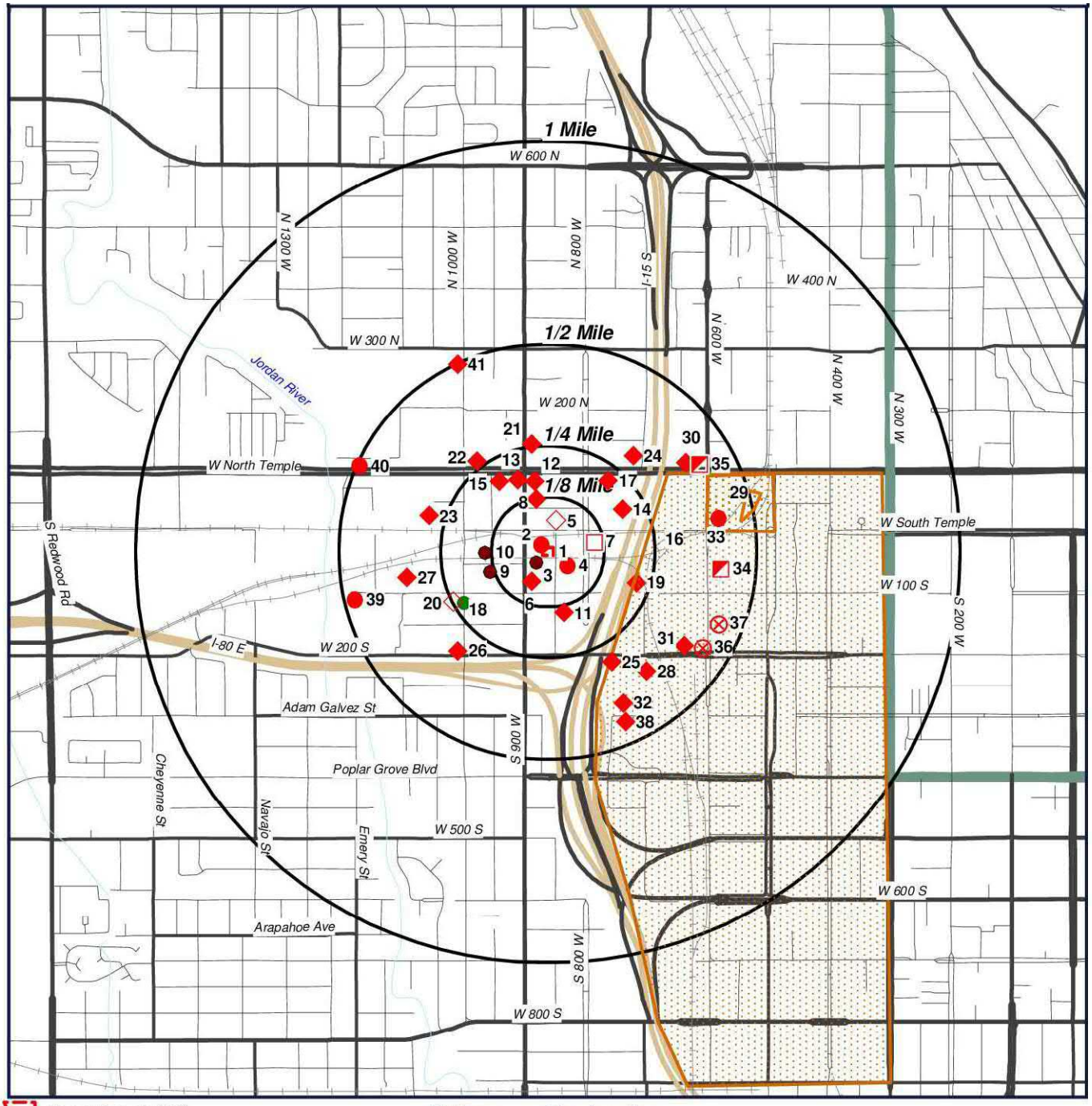
TRIBAL LISTING

*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
USTR08	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
LUSTR08	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
ODINDIAN	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
INDIANRES	1.0000	0	0	0	0	0	NS	0
SUB-TOTAL		0	0	0	0	0	0	0
TOTAL		33	11	22	30	0	0	96

NOTES:
NS = NOT SEARCHED
TP/AP = TARGET PROPERTY/ADJACENT PROPERTY

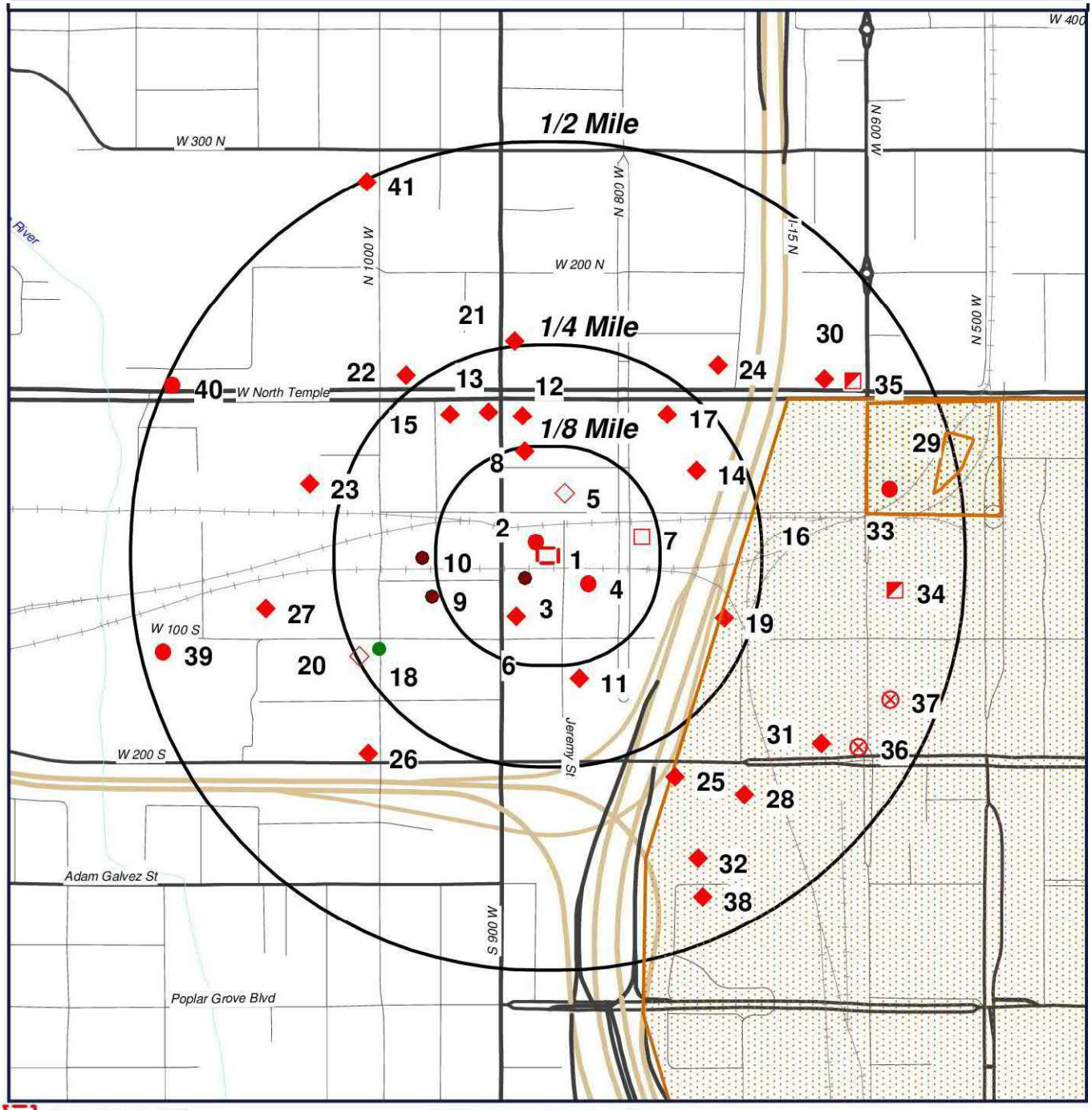
Radius Map 1



Target Property (TP)
BRS
BF
CERCLIS
RUST
LUST
RCRAGR08
BF
ALTFUELS
RODS
CERCLIS
NPL
SEMS
NPL
RCRAC
RCRASUBC
VCP

[Click here to access Satellite view]

Radius Map 2



Target Property (TP)
BRS
BF
CERCLIS
RUST
LUST
RCRAGR08
BF
ALTFUELS
RODS
CERCLIS
NPL
SEMS
NPL
RCRAC
RCRASUBC
VCP

Schovaers Electronics
22 Jeremy St
Salt Lake City, Utah
84104

N
W E
S

0' 500' 1000' 1500'
SCALE: 1" = 1000'

Click here to access Satellite view

Ortho Map

Target Property (TP)
BRS
BF
CERCLIS
RUST
LUST
RCRAGR08
BF
ALTFUELS
RODS
CERCLIS
NPL
SEMS
NPL
RCRAC
RCRASUBC
VCP

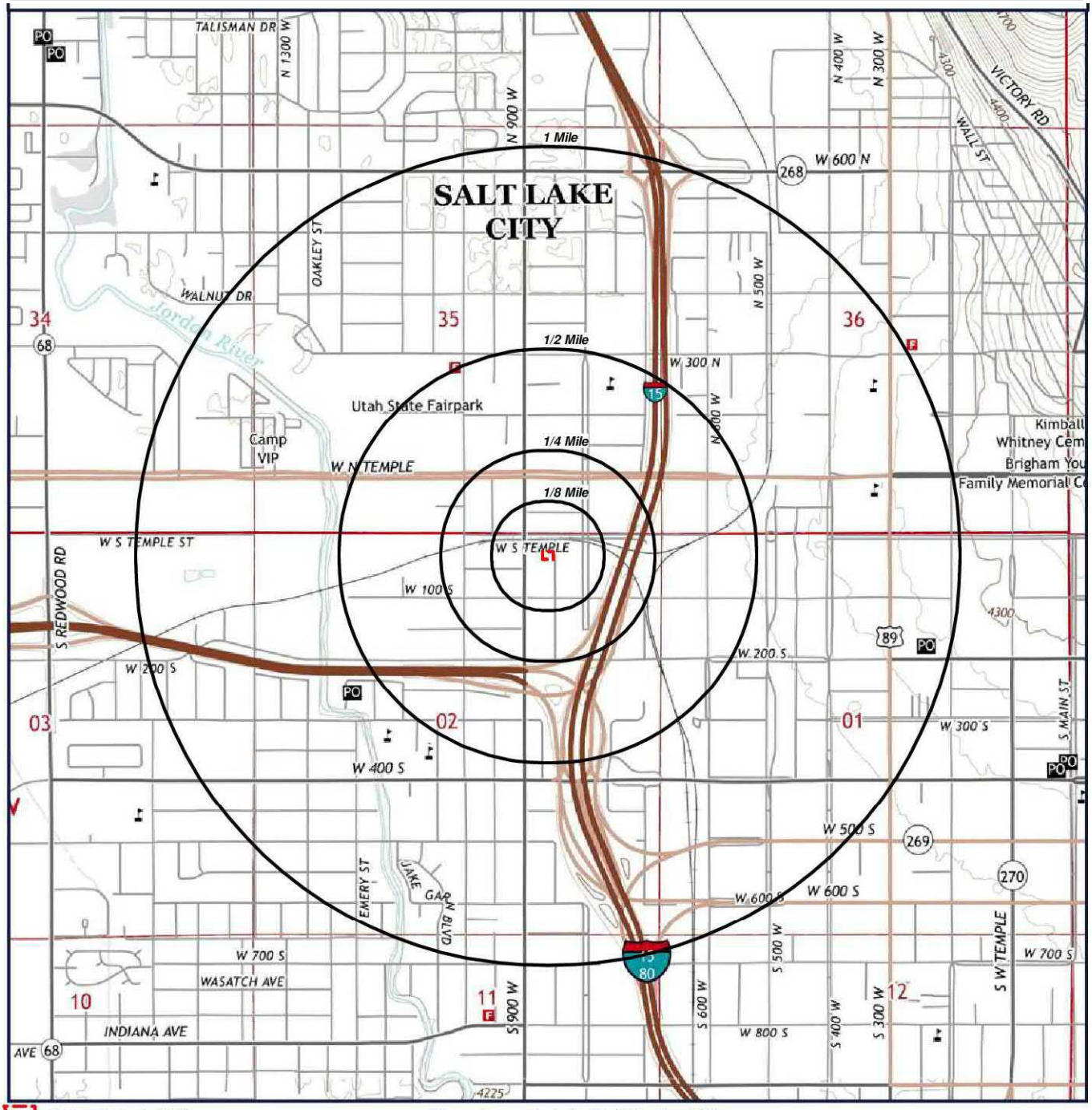
Quadrangle(s): Salt Lake City North
Schovaers Electronics
22 Jeremy St
Salt Lake City, Utah
84104

N
W
E
S

0' 500' 1000' 1500'
SCALE: 1" = 1000'

Click here to access Satellite view

Topographic Map



Target Property (TP)

Quadrangle(s): Salt Lake City North
Source: USGS, 02/05/2014
Schovaers Electronics
22 Jeremy St
Salt Lake City, Utah
84104

N
W E
S

0' 1000' 2000' 3000'
SCALE: 1" = 2000'

[Click here to access Satellite view]

Located Sites Summary

*NOTE: Standard environmental records are displayed in **bold**.*

Map ID#	Database Name	Site ID#	Relative Elevation	Distance From Site	Site Name	Address	PAGE #
1	***BF***	***199723***	***Equal (4,226 ft.)***	***TP***	***22 S JEREMY STREET - SCHOVAERS***	***22 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104***	***23***
1	ECHOR08	110010918999	Equal (4,226 ft.)	TP	SCHOVAERS ELECTRONICS CORP.	22 JEREMY, SALT LAKE CITY, UT 84104	25
1	ECHOR08	110069995353	Equal (4,226 ft.)	TP	SCHOVAERS ELECTRONICS CORPORATION	22 JEREMY STREET, SALT LAKE CITY, UT 84104	26
1	FRSUT	110010918999	Equal (4,226 ft.)	TP	SCHOVAERS ELECTRONICS CORP.	22 JEREMY, SALT LAKE CITY, UT 84104	27
1	FRSUT	110057516610	Equal (4,226 ft.)	TP	SCHOVAER ELECTRONICS CORP	22 S JEREMY ST 840 W, SLC, UT 84104	28
1	FRSUT	110069239531	Equal (4,226 ft.)	TP	22 S JEREMY STREET - SCHOVAERS	22 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104	29
1	FRSUT	110069995353	Equal (4,226 ft.)	TP	SCHOVAERS ELECTRONICS CORPORATION	22 JEREMY STREET, SALT LAKE CITY, UT 84104	30
1	ICISNPDES	UTU001351INPDES	Equal (4,226 ft.)	TP	SCHOVAERS ELECTRONICS CORPORATION	22 JEREMY STREET, SALT LAKE CITY, UT 84104	31
1	***RCRAGR08***	***UTD085325769***	***Equal (4,226 ft.)***	***TP***	***SCHOVAERS ELECTRONICS CORP.***	***22 JEREMY, SALT LAKE CITY, UT 84104***	***33***
2	AIRSAFS	1004764	Equal (4,226 ft.)	0.007 mi. NNW (37 ft.)	CROWN PLATING COMPANY	14 JEREMY STREET, SALT LAKE CITY, UT 84104	35
2	***BF***	***199141***	***Equal (4,226 ft.)***	***0.017 mi. E (90 ft.)***	***15 SOUTH JEREMY STREET_HERITAGE FORGE***	***15 SOUTH JEREMY STREET 16 SOUTH 800 WEST, SALT LAKE CITY, UT 84104***	***40***
2	***BF***	***199721***	***Equal (4,226 ft.)***	***0.019 mi. N (100 ft.)***	***8 SOUTH JEREMY STREET - CROWN PLATING***	***8 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104***	***42***
2	***BF***	***199722***	***Equal (4,226 ft.)***	***0.007 mi. NNW (37 ft.)***	***14 SOUTH JEREMY STREET - CROWN PLATING***	***14 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104***	***44***
2	***BF***	***209762***	***Equal (4,226 ft.)***	***0.018 mi. S (95 ft.)***	***42 SOUTH JEREMY_LIBERTY AUTO***	***42 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104***	***46***
2	BRS	UTD009086372	Equal (4,226 ft.)	0.007 mi. NNW (37 ft.)	CROWN PLATING CO. INC.	14 JEREMY STREET, SALT LAKE CITY, UT 84104	47
2	DOCKETS	08-1985-0031	Equal (4,226 ft.)	0.017 mi. E (90 ft.)	CREED LABORATORIES & MANUFACTU	15 JEREMY, SALT LAKE CITY, UT 84104	48
2	ECHOR08	110002159789	Equal (4,226 ft.)	0.007 mi. NNW (37 ft.)	CROWN PLATING CO, INC	14 JEREMY ST, SALT LAKE CITY, UT 84104	49
2	ECHOR08	110011678755	Equal (4,226 ft.)	0.017 mi. E (90 ft.)	CREED LABORATORIES	15 JERMEY STREET, SALT LAKE CITY, UT 84104	50
2	***ERNSUT***	***1148307***	***Equal (4,226 ft.)***	***0.007 mi. NNW (37 ft.)***		***14 JEREMY ST., SALT LAKE CITY, UT***	***51***
2	FRSUT	110002154588	Equal (4,226 ft.)	0.017 mi. E (90 ft.)	CHEMBRITE	15 S 840 W, SALT LAKE CITY, UT 84104	52

Located Sites Summary

*NOTE: Standard environmental records are displayed in **bold**.*

Map ID#	Database Name	Site ID#	Relative Elevation	Distance From Site	Site Name	Address	PAGE #
2	FRSUT	110002159789	Equal (4,226 ft.)	0.007 mi. NNW (37 ft.)	CROWN PLATING CO, INC	14 JEREMY ST, SALT LAKE CITY, UT 84104	53
2	FRSUT	110011678755	Equal (4,226 ft.)	0.017 mi. E (90 ft.)	CREED LABORATORIES	15 JERMEY STREET, SALT LAKE CITY, UT 84104	54
2	FRSUT	110067367334	Equal (4,226 ft.)	0.018 mi. S (95 ft.)	42 SOUTH JEREMY_LIBERTY AUTO	42 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104	55
2	FRSUT	110069239504	Equal (4,226 ft.)	0.017 mi. E (90 ft.)	15 SOUTH JEREMY STREET_HERITAGE FORGE	15 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104	56
2	FRSUT	110069239513	Equal (4,226 ft.)	0.019 mi. N (100 ft.)	8 SOUTH JEREMY STREET - CROWN PLATING	8 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104	57
2	FRSUT	110069239522	Equal (4,226 ft.)	0.007 mi. NNW (37 ft.)	14 SOUTH JEREMY STREET - CROWN PLATING	14 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104	58
2	ICIS	110011678755	Equal (4,226 ft.)	0.017 mi. E (90 ft.)	CREED LABORATORIES	15 JEREMY ST, SALT LAKE CITY, UT 84104	59
2	ICISNPDES	UTR000378INPDES	Equal (4,226 ft.)	0.007 mi. NNW (37 ft.)	CROWN PLATING CO, INC	14 JEREMY ST., SALT LAKE CITY, UT 84104	60
2	ICISNPDES	UTU000354INPDES	Equal (4,226 ft.)	0.007 mi. NNW (37 ft.)	CROWN PLATING, INC.	14 JEREMY STREET 14 JEREMY STREET, SALT LAKE CITY, UT 84104	62
2	NPDESR08	UTU000354	Equal (4,226 ft.)	0.007 mi. NNW (37 ft.)	CROWN PLATING, INC.	14 JEREMY STREET 14 JEREMY STREET, SALINA, UT 84104	64
2	***RCRAGR08***	***UTD009086372***	***Equal (4,226 ft.)***	***0.007 mi. NNW (37 ft.)***	***CROWN PLATING CO. INC.***	***14 JEREMY STREET, SALT LAKE CITY, UT 84104***	***65***
2	***RCRANGR08***	***UTD089326235***	***Equal (4,226 ft.)***	***0.017 mi. E (90 ft.)***	***CREED LABORATORIES & MFG***	***15 JEREMY, SALT LAKE CITY, UT 84104***	***67***
2	***RUST***	***4001520***	***Equal (4,226 ft.)***	***0.017 mi. E (90 ft.)***	***CREED LABORATORIES***	***15 S JEREMY ST, SALT LAKE CITY, UT 84104***	***69***
3	***BF***	***209722***	***Equal (4,226 ft.)***	***0.024 mi. SW (127 ft.)***	***35 SOUTH 900 WEST_EL COMPADRE AND MUTUAL ENGINE REPAIR***	***35 SOUTH 900 WEST, SALT LAKE CITY, UT 84104***	***71***
4	***CERCLIS***	***UTN000802419***	***Equal (4,226 ft.)***	***0.046 mi. ESE (243 ft.)***	***BULLOUGH ASBESTOS***	***800 WEST 50 SOUTH, SALT LAKE CITY, UT 84104***	***72***
4	***LUST***	***4001968LUST***	***Equal (4,226 ft.)***	***0.046 mi. ESE (243 ft.)***	***BULLOUGH INSULATION (FORMER)***	***50 S 800 W, SALT LAKE CITY, UT 84104***	***73***
4	***RUST***	***4001968***	***Equal (4,226 ft.)***	***0.046 mi. ESE (243 ft.)***	***BULLOUGH INSULATION (FORMER)***	***50 S 800 W, SALT LAKE CITY, UT 84104***	***74***
4	***SEMSARCH***	***UTN000802419***	***Equal (4,226 ft.)***	***0.046 mi. ESE (243 ft.)***	***BULLOUGH ASBESTOS***	***800 WEST 50 SOUTH, SALT LAKE CITY, UT 84104***	***76***

Located Sites Summary

NOTE: Standard environmental records are displayed in **bold**.

Map ID#	Database Name	Site ID#	Relative Elevation	Distance From Site	Site Name	Address	PAGE #
5	RUST	4002172	Equal (4,226 ft.)	0.067 mi. N (354 ft.)	SPRINT P.O.P.	840 W SOUTH TEMPLE, SALT LAKE CITY, UT 84104	77
6	LUST	4000119LUST	Lower (4,224 ft.)	0.071 mi. SSW (375 ft.)	CALDER BROS. CO, INC.	79 S 900 W, SALT LAKE CITY, UT 84124	78
6	RUST	4000119	Lower (4,224 ft.)	0.071 mi. SSW (375 ft.)	CALDER BROS. CO, INC.	79 S 900 W, SALT LAKE CITY, UT 84124	79
7	RCRAGR08	UTR000004937	Lower (4,225 ft.)	0.105 mi. E (554 ft.)	PROGRESSIVE PLATING INC.	777 WEST SOUTH TEMPLE, SALT LAKE CITY, UT 84104	81
8	LUST	4002469LUST	Higher (4,227 ft.)	0.12 mi. N (634 ft.)	FAMILY DOLLAR	50 N 900 W, SALT LAKE CITY, UT 84104	83
8	RUST	4002469	Higher (4,227 ft.)	0.12 mi. N (634 ft.)	FAMILY DOLLAR	50 N 900 W, SALT LAKE CITY, UT 84104	84
9	BF	199724	Lower (4,225 ft.)	0.136 mi. WSW (718 ft.)	947 W FOLSOM - MARBLECAST	947 WEST FOLSOM AVENUE, SALT LAKE CITY, UT 84104	85
9	BF	199725	Lower (4,225 ft.)	0.151 mi. WSW (797 ft.)	955 WEST FOLSOM - SWANER	955 WEST FOLSOM AVENUE, SALT LAKE CITY, UT 84104	87
10	BF	209761	Lower (4,225 ft.)	0.142 mi. W (750 ft.)	25 SOUTH 1000 WEST_TIRE EXPRESS	25 SOUTH 1000 WEST, SALT LAKE CITY, UT 84104	89
11	LUST	4001850LUST	Higher (4,227 ft.)	0.144 mi. SSE (760 ft.)	JEREMY STREET LLC	123 S JEREMY ST (840 W), SALT LAKE CITY, UT 84104	90
11	RUST	4001850	Higher (4,227 ft.)	0.144 mi. SSE (760 ft.)	JEREMY STREET LLC	123 S JEREMY ST (840 W), SALT LAKE CITY, UT 84104	91
12	LUST	4001899LUST	Higher (4,227 ft.)	0.162 mi. N (855 ft.)	DAVID EARLY #5	875 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	93
12	RUST	4001899	Higher (4,227 ft.)	0.162 mi. N (855 ft.)	DAVID EARLY #5	875 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	94
13	LUST	4000251LUST	Higher (4,227 ft.)	0.177 mi. NNW (935 ft.)	SMITH'S GAS & VIDEO	905 WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116	97
13	RUST	4000251	Higher (4,227 ft.)	0.177 mi. NNW (935 ft.)	SMITH'S GAS & VIDEO	905 WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116	98
14	LUST	4000179LUST	Higher (4,228 ft.)	0.194 mi. ENE (1024 ft.)	CARTOW	738 W SOUTH TEMPLE, SALT LAKE CITY, UT 84104	101
14	RUST	4000179	Higher (4,228 ft.)	0.194 mi. ENE (1024 ft.)	CARTOW	738 W SOUTH TEMPLE, SALT LAKE CITY, UT 84104	102
15	LUST	4001483LUST	Higher (4,227 ft.)	0.196 mi. NW (1035 ft.)	M. KENT FOOTE	935 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	105
15	RUST	4001483	Higher (4,227 ft.)	0.196 mi. NW (1035 ft.)	M. KENT FOOTE	935 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	106
16	BF	PRE8	Higher (4,232 ft.)	0.21 mi. ESE (1109 ft.)	SALT LAKE CITY GATEWAY PILOT PROJECT	NORTH TEMPLE ON NORTH, 300 WEST ON EAST, I15 ON WEST, 900 SOUTH STREET ON SOUTH, SALT LAKE CITY, UT 84111	109

Located Sites Summary

*NOTE: Standard environmental records are displayed in **bold**.*

Map ID#	Database Name	Site ID#	Relative Elevation	Distance From Site	Site Name	Address	PAGE #
17	LUST	4000304LUST	Higher (4,229 ft.)	0.212 mi. NE (1119 ft.)	FLYING J	757 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	110
17	LUST	4000575LUST	Higher (4,229 ft.)	0.212 mi. NE (1119 ft.)	MINIT-LUBE #1020	757 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	111
17	RUST	4000304	Higher (4,229 ft.)	0.212 mi. NE (1119 ft.)	FLYING J	757 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	112
17	RUST	4000575	Higher (4,229 ft.)	0.212 mi. NE (1119 ft.)	MINIT-LUBE #1020	757 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	115
18	ALTFUELS	534	Lower (4,225 ft.)	0.214 mi. WSW (1130 ft.)	SALT LAKE OPERATIONS CENTER	1078 W 100 S, SALT LAKE CITY, UT 84104	118
19	LUST	4001593LUST	Higher (4,236 ft.)	0.215 mi. ESE (1135 ft.)	CITY CAB CO.	710 W 100 S, SALT LAKE CITY, UT 84104	119
19	RUST	4001593	Higher (4,236 ft.)	0.215 mi. ESE (1135 ft.)	CITY CAB CO.	710 W 100 S, SALT LAKE CITY, UT 84104	120
20	RUST	4002142	Lower (4,225 ft.)	0.247 mi. WSW (1304 ft.)	VIA WEST	118 S 1000 W, SALT LAKE CITY, UT 84104	121
21	LUST	4000211LUST	Equal (4,226 ft.)	0.255 mi. N (1346 ft.)	FRESH MARKET 2383	140 NORTH 900 WEST, SALT LAKE CITY, UT 84116	122
22	LUST	4001026LUST	Equal (4,226 ft.)	0.267 mi. NW (1410 ft.)	7-ELEVEN 1851-24573	960 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	123
23	LUST	4001638LUST	Lower (4,224 ft.)	0.291 mi. WNW (1536 ft.)	GRANITE MILL IND. COMPLEX	1055 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	124
24	LUST	4000190LUST	Higher (4,228 ft.)	0.298 mi. NE (1573 ft.)	WONDER HOSTESS BAKERY THRIFT SHOP	708 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	125
25	LUST	4000412LUST	Higher (4,227 ft.)	0.299 mi. SE (1579 ft.)	GENEVA ROCK PRODUCTS,INC.	748 W 300 S, SALT LAKE CITY, UT 84104	126
26	LUST	4002113LUST	Lower (4,225 ft.)	0.314 mi. SW (1658 ft.)	OLD GAS STATION	180 S 1000 W, SALT LAKE CITY, UT 84104	127
27	LUST	4000627LUST	Lower (4,224 ft.)	0.339 mi. W (1790 ft.)	S.L. NORTH SERVICE STATION	1070 W 100 S, SALT LAKE CITY, UT 84104	128
28	LUST	4001428LUST	Higher (4,229 ft.)	0.365 mi. SE (1927 ft.)	EIMCO PROCESS EQUIPMENT CO.	669 W 200 S, SALT LAKE CITY, UT 84140	129
29	CERCLIS	UTD980667240	Higher (4,243 ft.)	0.381 mi. E (2012 ft.)	UTAH POWER AND LIGHT AMERICAN BARREL CO.	600 W SOUTH TEMPLE, SALT LAKE CITY, UT 84101	130
29	NPL	UTD980667240	Higher (4,243 ft.)	0.381 mi. E (2012 ft.)	UTAH POWER & LIGHT/AMERICAN BARREL CO.	600 W SOUTH TEMPLE, SALT LAKE CITY, UT 84104	131
29	NPL	UTD980667240 NPL	Higher (4,243 ft.)	0.381 mi. E (2012 ft.)	UTAH POWER AND LIGHT AMERICAN BARREL CO.	600 W SOUTH TEMPLE, SALT LAKE CITY, UT 84101	151
29	RODS	UTD980667240	Higher (4,243 ft.)	0.381 mi. E (2012 ft.)	UTAH POWER & LIGHT/AMERICAN BARREL CO.	600 W SOUTH TEMPLE, SALT LAKE CITY, UT	152
29	SEMS	UTD980667240	Higher (4,243 ft.)	0.467 mi. E (2466 ft.)	UTAH POWER & LIGHT/AMERICAN BARREL CO.	600 W SOUTH TEMPLE, SALT LAKE CITY, UT 84104	156

Located Sites Summary

NOTE: Standard environmental records are displayed in **bold**.

Map ID#	Database Name	Site ID#	Relative Elevation	Distance From Site	Site Name	Address	PAGE #
30	LUST	4002453LUST	Higher (4,234 ft.)	0.386 mi. ENE (2038 ft.)	AIRPORT TRAX 650 WEST	650 W NORTH TEMPLE, SALT LAKE CITY, UT 84101	176
31	LUST	4001132LUST	Higher (4,233 ft.)	0.392 mi. ESE (2070 ft.)	UTA - CENTRAL DIVISION	610 W 200 S, SALT LAKE CITY, UT 84104	177
32	LUST	4000661LUST	Higher (4,231 ft.)	0.402 mi. SSE (2123 ft.)	NOYCE TRANSFER CO	736 W 300 S, SALT LAKE CITY, UT 84104	178
33	CERCLIS	UTD988066023	Higher (4,237 ft.)	0.415 mi. E (2191 ft.)	DESERET PAINT	14 N. 600 W., SALT LAKE CITY, UT 84116	179
33	SEMSARCH	UTD988066023	Higher (4,237 ft.)	0.415 mi. E (2191 ft.)	DESERET PAINT	14 N. 600 W., SALT LAKE CITY, UT 84116	180
34	RCRAC	UTD035348325	Higher (4,235 ft.)	0.416 mi. E (2196 ft.)	MYERS CONTAINER CORP	49 SOUTH 600 WEST, SALT LAKE CITY, UT 84101	181
35	RCRASUBC	UTD000818211	Higher (4,234 ft.)	0.418 mi. ENE (2207 ft.)	AMERICAN BARREL COMPANY	600 WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116	184
35	RCRAT	UTD000818211	Higher (4,234 ft.)	0.418 mi. ENE (2207 ft.)	AMERICAN BARREL COMPANY	600 WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116	187
36	VCP	VCP-C016	Higher (4,233 ft.)	0.432 mi. ESE (2281 ft.)	SALT LAKE CITY INTERMODAL HUB	600 WEST 200 SOUTH, SALT LAKE CITY, UT 84111	190
37	BF	215961	Higher (4,233 ft.)	0.441 mi. ESE (2328 ft.)	CENTRO CIVICO MEXICANO	155 SOUTH 600 WEST, SALT LAKE CITY, UT 84101	202
37	VCP	VCP-C087	Higher (4,233 ft.)	0.441 mi. ESE (2328 ft.)	CENTRO CIVICO MEXICANO	155 SOUTH 600 WEST, SALT LAKE CITY, UT 84101	204
38	LUST	4001878LUST	Higher (4,231 ft.)	0.447 mi. SSE (2360 ft.)	MARK STEEL	751 W 300 S, SALT LAKE CITY, UT 84104	205
39	CERCLIS	UTD980807234	Lower (4,225 ft.)	0.472 mi. W (2492 ft.)	MOUNTAIN FUELS SUPPLY CO.- OPERATIONS CTR	100 SOUTH 1078 WEST, SALT LAKE CITY, UT 84104	206
39	SEMSARCH	UTD980807234	Lower (4,225 ft.)	0.472 mi. W (2492 ft.)	MOUNTAIN FUELS SUPPLY CO.- OPERATIONS CTR	100 SOUTH 1078 WEST, SALT LAKE CITY, UT 84104	207
40	CERCLIS	UTD981547003	Higher (4,228 ft.)	0.491 mi. WNW (2592 ft.)	BARBER COMPANY TAR PRODUCTS	110O WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116	208
40	SEMSARCH	UTD981547003	Higher (4,228 ft.)	0.491 mi. WNW (2592 ft.)	BARBER COMPANY TAR PRODUCTS	1100 WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116	209
41	LUST	4000856LUST	Equal (4,226 ft.)	0.497 mi. NNW (2624 ft.)	S.L.C. FIRE DEPT. STATION #7	273 N 1000 W, SALT LAKE CITY, UT 84116	210

Elevation Summary

Elevations are collected from the USGS 3D Elevation Program 1/3 arc-second (approximately 10 meters) layer hosted at the NGTOC. .

Target Property Elevation: 4226 ft.

*NOTE: Standard environmental records are displayed in **bold**.*

EQUAL/HIGHER ELEVATION

Map ID#	Database Name	Elevation	Site Name	Address	Page #
1	***BF***	***4,226 ft.***	***22 S JEREMY STREET - SCHOVAERS***	***22 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104***	***23***
1	ECHOR08	4,226 ft.	SCHOVAERS ELECTRONICS CORP.	22 JEREMY, SALT LAKE CITY, UT 84104	25
1	ECHOR08	4,226 ft.	SCHOVAERS ELECTRONICS CORPORATION	22 JEREMY STREET, SALT LAKE CITY, UT 84104	26
1	FRSUT	4,226 ft.	SCHOVAERS ELECTRONICS CORP.	22 JEREMY, SALT LAKE CITY, UT 84104	27
1	FRSUT	4,226 ft.	SCHOVAER ELECTRONICS CORP	22 S JEREMY ST 840 W, SLC, UT 84104	28
1	FRSUT	4,226 ft.	22 S JEREMY STREET - SCHOVAERS	22 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104	29
1	FRSUT	4,226 ft.	SCHOVAERS ELECTRONICS CORPORATION	22 JEREMY STREET, SALT LAKE CITY, UT 84104	30
1	ICISNPDES	4,226 ft.	SCHOVAERS ELECTRONICS CORPORATION	22 JEREMY STREET, SALT LAKE CITY, UT 84104	31
1	***RCRAGR08***	***4,226 ft.***	***SCHOVAERS ELECTRONICS CORP.***	***22 JEREMY, SALT LAKE CITY, UT 84104***	***33***
2	AIRSAFS	4,226 ft.	CROWN PLATING COMPANY	14 JEREMY STREET, SALT LAKE CITY, UT 84104	35
2	***BF***	***4,226 ft.***	***15 SOUTH JEREMY STREET_HERITAGE FORGE***	***15 SOUTH JEREMY STREET 16 SOUTH 800 WEST, SALT LAKE CITY, UT 84104***	***40***
2	***BF***	***4,226 ft.***	***8 SOUTH JEREMY STREET - CROWN PLATING***	***8 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104***	***42***
2	***BF***	***4,226 ft.***	***14 SOUTH JEREMY STREET - CROWN PLATING***	***14 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104***	***44***
2	***BF***	***4,226 ft.***	***42 SOUTH JEREMY_LIBERTY AUTO***	***42 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104***	***46***
2	BRS	4,226 ft.	CROWN PLATING CO. INC.	14 JEREMY STREET, SALT LAKE CITY, UT 84104	47
2	DOCKETS	4,226 ft.	CREED LABORATORIES & MANUFACTU	15 JEREMY, SALT LAKE CITY, UT 84104	48
2	ECHOR08	4,226 ft.	CROWN PLATING CO, INC	14 JEREMY ST, SALT LAKE CITY, UT 84104	49
2	ECHOR08	4,226 ft.	CREED LABORATORIES	15 JERMEY STREET, SALT LAKE CITY, UT 84104	50
2	***ERNSUT***	***4,226 ft.***		***14 JEREMY ST., SALT LAKE CITY, UT***	***51***
2	FRSUT	4,226 ft.	CHEMBRITE	15 S 840 W, SALT LAKE CITY, UT 84104	52
2	FRSUT	4,226 ft.	CROWN PLATING CO, INC	14 JEREMY ST, SALT LAKE CITY, UT 84104	53
2	FRSUT	4,226 ft.	CREED LABORATORIES	15 JERMEY STREET, SALT LAKE CITY, UT 84104	54
2	FRSUT	4,226 ft.	42 SOUTH JEREMY_LIBERTY AUTO	42 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104	55
2	FRSUT	4,226 ft.	15 SOUTH JEREMY STREET_HERITAGE FORGE	15 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104	56
2	FRSUT	4,226 ft.	8 SOUTH JEREMY STREET - CROWN PLATING	8 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104	57

Elevation Summary

Map ID#	Database Name	Elevation	Site Name	Address	Page #
2	FRSUT	4,226 ft.	14 SOUTH JEREMY STREET - CROWN PLATING	14 SOUTH JEREMY STREET, SALT LAKE CITY, UT 84104	58
2	ICIS	4,226 ft.	CREED LABORATORIES	15 JEREMY ST, SALT LAKE CITY, UT 84104	59
2	ICISNPDES	4,226 ft.	CROWN PLATING CO, INC	14 JEREMY ST., SALT LAKE CITY, UT 84104	60
2	ICISNPDES	4,226 ft.	CROWN PLATING, INC.	14 JEREMY STREET 14 JEREMY STREET, SALT LAKE CITY, UT 84104	62
2	NPDESR08	4,226 ft.	CROWN PLATING, INC.	14 JEREMY STREET 14 JEREMY STREET, SALINA, UT 84104	64
2	***RCRAGR08***	***4,226 ft.***	***CROWN PLATING CO. INC.***	***14 JEREMY STREET, SALT LAKE CITY, UT 84104***	***65***
2	***RCRANGR08***	***4,226 ft.***	***CREED LABORATORIES & MFG***	***15 JEREMY, SALT LAKE CITY, UT 84104***	***67***
2	***RUST***	***4,226 ft.***	***CREED LABORATORIES***	***15 S JEREMY ST, SALT LAKE CITY, UT 84104***	***69***
3	***BF***	***4,226 ft.***	***35 SOUTH 900 WEST_EL COMPADRE AND MUTUAL ENGINE REPAIR***	***35 SOUTH 900 WEST, SALT LAKE CITY, UT 84104***	***71***
4	***CERCLIS***	***4,226 ft.***	***BULLOUGH ASBESTOS***	***800 WEST 50 SOUTH, SALT LAKE CITY, UT 84104***	***72***
4	***LUST***	***4,226 ft.***	***BULLOUGH INSULATION (FORMER)***	***50 S 800 W, SALT LAKE CITY, UT 84104***	***73***
4	***RUST***	***4,226 ft.***	***BULLOUGH INSULATION (FORMER)***	***50 S 800 W, SALT LAKE CITY, UT 84104***	***74***
4	***SEMSARCH***	***4,226 ft.***	***BULLOUGH ASBESTOS***	***800 WEST 50 SOUTH, SALT LAKE CITY, UT 84104***	***76***
5	***RUST***	***4,226 ft.***	***SPRINT P.O.P.***	***840 W SOUTH TEMPLE, SALT LAKE CITY, UT 84104***	***77***
8	***LUST***	***4,227 ft.***	***FAMILY DOLLAR***	***50 N 900 W, SALT LAKE CITY, UT 84104***	***83***
8	***RUST***	***4,227 ft.***	***FAMILY DOLLAR***	***50 N 900 W, SALT LAKE CITY, UT 84104***	***84***
11	***LUST***	***4,227 ft.***	***JEREMY STREET LLC***	***123 S JEREMY ST (840 W), SALT LAKE CITY, UT 84104***	***90***
11	***RUST***	***4,227 ft.***	***JEREMY STREET LLC***	***123 S JEREMY ST (840 W), SALT LAKE CITY, UT 84104***	***91***
12	***LUST***	***4,227 ft.***	***DAVID EARLY #5***	***875 W NORTH TEMPLE, SALT LAKE CITY, UT 84116***	***93***
12	***RUST***	***4,227 ft.***	***DAVID EARLY #5***	***875 W NORTH TEMPLE, SALT LAKE CITY, UT 84116***	***94***
13	***LUST***	***4,227 ft.***	***SMITH'S GAS & VIDEO***	***905 WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116***	***97***
13	***RUST***	***4,227 ft.***	***SMITH'S GAS & VIDEO***	***905 WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116***	***98***
14	***LUST***	***4,228 ft.***	***CARTOW***	***738 W SOUTH TEMPLE, SALT LAKE CITY, UT 84104***	***101***
14	***RUST***	***4,228 ft.***	***CARTOW***	***738 W SOUTH TEMPLE, SALT LAKE CITY, UT 84104***	***102***
15	***LUST***	***4,227 ft.***	***M. KENT FOOTE***	***935 W NORTH TEMPLE, SALT LAKE CITY, UT 84116***	***105***
15	***RUST***	***4,227 ft.***	***M. KENT FOOTE***	***935 W NORTH TEMPLE, SALT LAKE CITY, UT 84116***	***106***
16	***BF***	***4,232 ft.***	***SALT LAKE CITY GATEWAY PILOT PROJECT***	***NORTH TEMPLE ON NORTH, 300 WEST ON EAST, I15 ON WEST, 900 SOUTH STREET ON SOUTH, SALT LAKE CITY, UT 84111***	***109***

Elevation Summary

Map ID#	Database Name	Elevation	Site Name	Address	Page #
17	LUST	4,229 ft.	FLYING J	757 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	110
17	LUST	4,229 ft.	MINIT-LUBE #1020	757 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	111
17	RUST	4,229 ft.	FLYING J	757 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	112
17	RUST	4,229 ft.	MINIT-LUBE #1020	757 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	115
19	LUST	4,236 ft.	CITY CAB CO.	710 W 100 S, SALT LAKE CITY, UT 84104	119
19	RUST	4,236 ft.	CITY CAB CO.	710 W 100 S, SALT LAKE CITY, UT 84104	120
21	LUST	4,226 ft.	FRESH MARKET 2383	140 NORTH 900 WEST, SALT LAKE CITY, UT 84116	122
22	LUST	4,226 ft.	7-ELEVEN 1851-24573	960 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	123
24	LUST	4,228 ft.	WONDER HOSTESS BAKERY THRIFT SHOP	708 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	125
25	LUST	4,227 ft.	GENEVA ROCK PRODUCTS,INC.	748 W 300 S, SALT LAKE CITY, UT 84104	126
28	LUST	4,229 ft.	EIMCO PROCESS EQUIPMENT CO.	669 W 200 S, SALT LAKE CITY, UT 84140	129
29	CERCLIS	4,243 ft.	UTAH POWER AND LIGHT AMERICAN BARREL CO.	600 W SOUTH TEMPLE, SALT LAKE CITY, UT 84101	130
29	NPL	4,243 ft.	UTAH POWER & LIGHT/AMERICAN BARREL CO.	600 W SOUTH TEMPLE, SALT LAKE CITY, UT 84104	131
29	NPL	4,243 ft.	UTAH POWER AND LIGHT AMERICAN BARREL CO.	600 W SOUTH TEMPLE, SALT LAKE CITY, UT 84101	151
29	RODS	4,243 ft.	UTAH POWER & LIGHT/AMERICAN BARREL CO.	600 W SOUTH TEMPLE, SALT LAKE CITY, UT	152
29	SEMS	4,243 ft.	UTAH POWER & LIGHT/AMERICAN BARREL CO.	600 W SOUTH TEMPLE, SALT LAKE CITY, UT 84104	156
30	LUST	4,234 ft.	AIRPORT TRAX 650 WEST	650 W NORTH TEMPLE, SALT LAKE CITY, UT 84101	176
31	LUST	4,233 ft.	UTA - CENTRAL DIVISION	610 W 200 S, SALT LAKE CITY, UT 84104	177
32	LUST	4,231 ft.	NOYCE TRANSFER CO	736 W 300 S, SALT LAKE CITY, UT 84104	178
33	CERCLIS	4,237 ft.	DESERET PAINT	14 N. 600 W., SALT LAKE CITY, UT 84116	179
33	SEMSARCH	4,237 ft.	DESERET PAINT	14 N. 600 W., SALT LAKE CITY, UT 84116	180
34	RCRAC	4,235 ft.	MYERS CONTAINER CORP	49 SOUTH 600 WEST, SALT LAKE CITY, UT 84101	181
35	RCRASUBC	4,234 ft.	AMERICAN BARREL COMPANY	600 WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116	184
35	RCRAT	4,234 ft.	AMERICAN BARREL COMPANY	600 WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116	187
36	VCP	4,233 ft.	SALT LAKE CITY INTERMODAL HUB	600 WEST 200 SOUTH, SALT LAKE CITY, UT 84111	190
37	BF	4,233 ft.	CENTRO CIVICO MEXICANO	155 SOUTH 600 WEST, SALT LAKE CITY, UT 84101	202

Elevation Summary

Map ID#	Database Name	Elevation	Site Name	Address	Page #
37	VCP	4,233 ft.	CENTRO CIVICO MEXICANO	155 SOUTH 600 WEST, SALT LAKE CITY, UT 84101	204
38	LUST	4,231 ft.	MARK STEEL	751 W 300 S, SALT LAKE CITY, UT 84104	205
40	CERCLIS	4,228 ft.	BARBER COMPANY TAR PRODUCTS	110O WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116	208
40	SEMSARCH	4,228 ft.	BARBER COMPANY TAR PRODUCTS	1100 WEST NORTH TEMPLE, SALT LAKE CITY, UT 84116	209
41	LUST	4,226 ft.	S.L.C. FIRE DEPT. STATION #7	273 N 1000 W, SALT LAKE CITY, UT 84116	210

LOWER ELEVATION

Map ID#	Database Name	Elevation	Site Name	Address	Page #
6	LUST	4,224 ft.	CALDER BROS. CO, INC.	79 S 900 W, SALT LAKE CITY, UT 84124	78
6	RUST	4,224 ft.	CALDER BROS. CO, INC.	79 S 900 W, SALT LAKE CITY, UT 84124	79
7	RCRAGR08	4,225 ft.	PROGRESSIVE PLATING INC.	777 WEST SOUTH TEMPLE, SALT LAKE CITY, UT 84104	81
9	BF	4,225 ft.	947 W FOLSOM - MARBLECAST	947 WEST FOLSOM AVENUE, SALT LAKE CITY, UT 84104	85
9	BF	4,225 ft.	955 WEST FOLSOM - SWANER	955 WEST FOLSOM AVENUE, SALT LAKE CITY, UT 84104	87
10	BF	4,225 ft.	25 SOUTH 1000 WEST_TIRE EXPRESS	25 SOUTH 1000 WEST, SALT LAKE CITY, UT 84104	89
18	ALTFUELS	4,225 ft.	SALT LAKE OPERATIONS CENTER	1078 W 100 S, SALT LAKE CITY, UT 84104	118
20	RUST	4,225 ft.	VIA WEST	118 S 1000 W, SALT LAKE CITY, UT 84104	121
23	LUST	4,224 ft.	GRANITE MILL IND. COMPLEX	1055 W NORTH TEMPLE, SALT LAKE CITY, UT 84116	124
26	LUST	4,225 ft.	OLD GAS STATION	180 S 1000 W, SALT LAKE CITY, UT 84104	127
27	LUST	4,224 ft.	S.L. NORTH SERVICE STATION	1070 W 100 S, SALT LAKE CITY, UT 84104	128
39	CERCLIS	4,225 ft.	MOUNTAIN FUELS SUPPLY CO.-OPERATIONS CTR	100 SOUTH 1078 WEST, SALT LAKE CITY, UT 84104	206
39	SEMSARCH	4,225 ft.	MOUNTAIN FUELS SUPPLY CO.-OPERATIONS CTR	100 SOUTH 1078 WEST, SALT LAKE CITY, UT 84104	207

MAP ID# 1

Distance from Property: 0 mi. (0 ft.) X
Elevation: 4,226 ft. (Equal to TP)

SITE INFORMATION

ID#: **199723**

NAME: **22 S JEREMY STREET - SCHOVAERS**

ADDRESS: **22 SOUTH JEREMY STREET**
SALT LAKE CITY, UT 84104

TYPE FUNDING: **HAZARDOUS**

PREDOMINANT PAST USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**0.34**

FUTURE USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**NOT REPORTED**

PROPERTY HIGHLIGHT:
NOT REPORTED

PROPERTY SIZE (Acres): **0.34**

CURRENT OWNER: **SCHOVAERS ELECTRONICS**

PROPERTY DESCRIPTION/ FORMER USE:
THE SITE IS AN APPROXIMATELY .34 ACRE PARCEL WITH A 6,000 SQ FT INDUSTRIAL BUILDING. A 400 SQ FT GARAGE IS ALSO PRESENT ON THE NW SIDE OF THE SITE. PAVED PARKING AREAS ARE LOCATED TO THE EAST AND NORTH OF THE BUILDING. A SMALL WEEDY AREA IS PRESENT ON THE

CONTAMINATE(S): **ASBESTOS, VOCS, OTHER METALS**

CONTAMINATE(S) CLEANED UP: **NOT REPORTED**

MEDIA(S) AFFECTED: **SOIL, GROUND WATER**

MEDIA(S) CLEANED UP: **NOT REPORTED**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE II ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **10/21/2015 0:00**

ASSESSMENT COMPLETION DATE: **2/8/2016 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE I ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **3/12/2015 0:00**

ASSESSMENT COMPLETION DATE: **8/31/2015 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

Enforcement and Compliance History Information (ECHOR08)

MAP ID# 1

Distance from Property: 0 mi. (0 ft.) X
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

UNIQUE ID: **110010918999**
REGISTRY ID: **110010918999**
NAME: **SCHOVAERS ELECTRONICS CORP.**
ADDRESS: **22 JEREMY**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
FACILITY LINK: *Facility Detail Report*

Back to Report Summary

Enforcement and Compliance History Information (ECHOR08)

MAP ID# 1

Distance from Property: 0 mi. (0 ft.) X
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

UNIQUE ID: **110069995353**
REGISTRY ID: **110069995353**
NAME: **SCHOVAERS ELECTRONICS CORPORATION**
ADDRESS: **22 JEREMY STREET**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
FACILITY LINK: *Facility Detail Report*

Back to Report Summary

Facility Registry System (FRSUT)

MAP ID# 1

Distance from Property: 0 mi. (0 ft.) X
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110010918999**

NAME: **SCHOVAERS ELECTRONICS CORP.**

LOCATION ADDRESS: **22 JEREMY**
SALT LAKE CITY, UT 84104

COUNTY: **SALT LAKE**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

SCHOVAERS ELECTRONICS CORP.

PROGRAM/S LISTED FOR THIS FACILITY

RCRAINFO - RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)

NO SIC DATA REPORTED

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)

NO NAICS DATA REPORTED

Back to Report Summary

Facility Registry System (FRSUT)

MAP ID# 1

Distance from Property: 0 mi. (0 ft.) X
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110057516610**

NAME: **SCHOVAER ELECTRONICS CORP**

LOCATION ADDRESS: **22 S JEREMY ST 840 W**
SLC, UT 84104

COUNTY: **SALT LAKE**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

SCHOVAER ELECTRONICS CORP

PROGRAM/S LISTED FOR THIS FACILITY

OSHA-IMIS - OSHA-IMIS

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)

3674 - SEMICONDUCTORS AND RELATED DEVICES

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)

NO NAICS DATA REPORTED

Back to Report Summary

Facility Registry System (FRSUT)

MAP ID# 1

Distance from Property: 0 mi. (0 ft.) X
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110069239531**

NAME: **22 S JEREMY STREET - SCHOVAERS**

LOCATION ADDRESS: **22 SOUTH JEREMY STREET**
SALT LAKE CITY, UT 84104

COUNTY: **SALT LAKE COUNTY**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

22 S JEREMY STREET - SCHOVAERS

PROGRAM/S LISTED FOR THIS FACILITY

ACRES - ASSESSMENT, CLEANUP AND REDEVELOPMENT EXCHANGE SYSTEM

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)

NO SIC DATA REPORTED

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)

NO NAICS DATA REPORTED

Back to Report Summary

Facility Registry System (FRSUT)

MAP ID# 1

Distance from Property: 0 mi. (0 ft.) X
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110069995353**

NAME: **SCHOVAERS ELECTRONICS CORPORATION**

LOCATION ADDRESS: **22 JEREMY STREET**
SALT LAKE CITY, UT 84104

COUNTY: **SALT LAKE**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:
NO ALTERNATIVE NAME(S) LISTED FOR THIS FACILITY

PROGRAM/S LISTED FOR THIS FACILITY
NPDES - NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)
NO SIC DATA REPORTED

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)
NO NAICS DATA REPORTED

Back to Report Summary

Integrated Compliance Information System National Pollutant Discharge Elimination System (ICISNPDES)

MAP ID# 1

Distance from Property: 0 mi. (0 ft.) X
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **UTU001351INPDES**
NPDES ID: **UTU001351** FACILITY #: **110069995353**
NAME: **SCHOVAERS ELECTRONICS CORPORATION**
PHYSICAL ADDRESS: **22 JEREMY STREET**
SALT LAKE CITY UT 84104
COUNTY: **SALT LAKE**
FACILITY TYPE: **PRIVATELY OWNED FACILITY**
IMPAIRED WATERS: **NOT REPORTED**

STANDARD INDUSTRIAL CLASSIFICATION

- NOT REPORTED -

PERMITS

FACILITY TYPE INDICATOR: **NOT REPORTED**
PERMIT TYPE: **UNPERMITTED FACILITY**
MAJOR MINOR FACILITY: **UNPERMITTED FACILITIES**
PERMIT STATUS: **NOT REPORTED**
WATER BODY: **NOT REPORTED**
PERMIT NAME: **NOT REPORTED**
AGENCY TYPE: **NOT REPORTED**
ORIGINAL ISSUE DATE: **NOT REPORTED**
ISSUE DATE: **NOT REPORTED**
ISSUING AGENCY: **NOT REPORTED**
EFFECTIVE DATE: **NOT REPORTED**
EXPIRATION DATE: **NOT REPORTED**
RETIREMENT DATE: **NOT REPORTED**
TERMINATION DATE: **NOT REPORTED**
PERMIT COMPLIANCE STATUS: **NOT REPORTED**
PERMIT SUBJECT TO DMR RUN: **NOT REPORTED**
REPORTABLE NONCOMPLIANCE TRACKING IS ON: **YES**

INSPECTIONS

MONITOR TYPE: **EVALUATION**
LEAD AGENCY: **STATE**
ACTUAL BEGIN DATE: **09/29/2016**
ACTUAL END DATE: **09/29/2016**

HISTORIC COMPLIANCE

- NO HISTORIC COMPLIANCE REPORTED -

SINGLE EVENT VIOLATIONS

- NO SINGLE EVENT VIOLATIONS REPORTED -

FORMAL ENFORCEMENT ACTIONS

- NO FORMAL ENFORCEMENT ACTIONS REPORTED -

EFFLUENT VIOLATIONS

- NOT REPORTED -

EFFLUENT VIOLATIONS contd..

- NOT REPORTED -

EFFLUENT VIOLATIONS contd..

- NOT REPORTED -

Back to Report Summary

Resource Conservation & Recovery Act - Generator (RCRAGR08)

MAP ID# 1

Distance from Property: 0 mi. (0 ft.) X
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

EPA ID#: **UTD085325769**
NAME: **SCHOVAERS ELECTRONICS CORP.**
ADDRESS: **22 JEREMY**
SALT LAKE CITY, UT 84104
CONTACT NAME: **LEON SCHOVAERS**
CONTACT ADDRESS: **22 JEREMY**
SALT LAKE CITY UT 84104
CONTACT PHONE: **801-521-2668**
NON-NOTIFIER: **NOT A NON-NOTIFIER**
DATE RECEIVED BY AGENCY: **02/16/1994**

OWNER TYPE: **PRIVATE**
OWNER NAME: **STOCKHOLDERS**
OPERATOR TYPE: **NOT REPORTED**
OPERATOR NAME: **NOT REPORTED**

CERTIFICATION

CERTIFICATION NAME:	CERTIFICATION TITLE:	CERTIFICATION SIGNED DATE:
BOB SCHOVAERS	**PRESIDENT**	**02/16/1994**
BOB SCHOVAERS	**VICE PRES.**	**03/31/1992**
BOB SCHOVAERS	**V.P. FOR SALES**	**03/03/1990**

INDUSTRY CLASSIFICATION (NAICS)

334412 - BARE PRINTED CIRCUIT BOARD MANUFACTURING

CURRENT ACTIVITY INFORMATION

GENERATOR STATUS: **SMALL QUANTITY GENERATOR** LAST UPDATED DATE: **09/15/2000**
SUBJECT TO CORRECTIVE ACTION UNIVERSE: **NO**
TDSFs POTENTIALLY SUBJECT TO CORRECTIVE ACTION UNDER 3004 (u)/(v) UNIVERSE: **NO**
TDSFs ONLY SUBJECT TO CORRECTIVE ACTION UNDER DISCRETIONARY AUTHORITIES UNIVERSE: **NO**
NON TSDFs WHERE RCRA CORRECTIVE ACTION HAS BEEN IMPOSED UNIVERSE: **NO**
CORRECTIVE ACTION WORKLOAD UNIVERSE: **NO**

IMPORTER: **NO**
MIXED WASTE GENERATOR: **NO**
RECYCLER: **NO**
TRANSPORTER: **NO**
ONSITE BURNER EXEMPTION: **NO**
FURNACE EXEMPTION: **NO**
USED OIL REFINER: **NO**
USED OIL TRANSFER FACILITY: **NO**

UNDERGROUND INJECTION: **NO**
UNIVERSAL WASTE DESTINATION FACILITY: **NO**
TRANSFER FACILITY: **NO**
USED OIL FUEL BURNER: **NO**
USED OIL PROCESSOR: **NO**
USED OIL FUEL MARKETER TO BURNER: **NO**
SPECIFICATION USED OIL MARKETER: **NO**
USED OIL TRANSPORTER: **NO**

COMPLIANCE, MONITORING AND ENFORCEMENT INFORMATION

EVALUATIONS

08/27/2014	**CEI**	**COMPLIANCE EVALUATION INSPECTION ON-SITE**
12/10/2009	**CEI**	**COMPLIANCE EVALUATION INSPECTION ON-SITE**

VIOLATIONS **- NO VIOLATIONS REPORTED -**

ENFORCEMENTS **- NO ENFORCEMENTS REPORTED -**

HAZARDOUS WASTE

D000

D002 **CORROSIVE WASTE**

D008 **LEAD**

UNIVERSAL WASTE **- NO UNIVERSAL WASTE REPORTED -**

CORRECTIVE ACTION AREA **- NO CORRECTIVE ACTION AREA INFORMATION REPORTED -**

CORRECTIVE ACTION EVENT **- NO CORRECTIVE ACTION EVENT REPORTED -**

Back to Report Summary

Aerometric Information Retrieval System / Air Facility Subsystem (AIRSAFS)

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

SITE INFORMATION

UNIQUE ID: **1004764**
PLANT ID: **1004764**
NAME: **CROWN PLATING COMPANY**
ADDRESS: **14 JEREMY STREET**
SALT LAKE CITY, UT 84104
CLASSIFICATION: **POTENTIAL UNCONTROLLED EMISSIONS <100 TONS/YEAR**
OPERATION STATUS: **OPERATING**
STATE COMPLIANCE STATUS: **NO APPLICABLE STATE REGULATION**
FACILITY TYPE: **PRIVATELY OWNED/OPERATED**
CURRENT HIGH PRIORITY VIOLATOR: **NOT REPORTED**
SIC DESCRIPTION: **ESTABLISHMENTS PRIMARILY ENGAGED IN ALL TYPES OF ELECTROPLATING, PLATING, ANODIZING, COLORING, AND FINISHING OF METALS AND FORMED PRODUCTS FOR THE TRADE.**

ENFORCEMENT ACTIONS

DATE ACHIEVED: **11/06/2006**
DATE RECORDED: **12/11/2006**
NATIONAL ACTION TYPE: **STATE CONDUCTED FCE/ON-SITE**
ALL AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
RESULTS OF STACK TEST AND TITLE V: **ACTION ACHIEVED**
POLLUTANT: **NOT REPORTED**
ALL POLLUTION IN VIOLATION: **NOT REPORTED**
TYPE OF VIOLATION(S): **NOT REPORTED**
PENALTY AMOUNT: **0**

DATE ACHIEVED: **08/10/2005**
DATE RECORDED: **12/11/2006**
NATIONAL ACTION TYPE: **STATE CONDUCTED FCE/ON-SITE**
ALL AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
RESULTS OF STACK TEST AND TITLE V: **ACTION ACHIEVED**
POLLUTANT: **NOT REPORTED**
ALL POLLUTION IN VIOLATION: **NOT REPORTED**
TYPE OF VIOLATION(S): **NOT REPORTED**
PENALTY AMOUNT: **0**

DATE ACHIEVED: **08/14/2001**
DATE RECORDED: **10/25/2001**
NATIONAL ACTION TYPE: **EPA INSPECTION - LEVEL 2 OR GREATER**
ALL AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
RESULTS OF STACK TEST AND TITLE V: **NOT REPORTED**
POLLUTANT: **NOT REPORTED**
ALL POLLUTION IN VIOLATION: **NOT REPORTED**
TYPE OF VIOLATION(S): **NOT REPORTED**
PENALTY AMOUNT: **0**

AIR PROGRAM

AIR PROGRAM STATUS: **OPERATING**
EPA COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**
POLLUTANT COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**
POLLUTANT: **TOTAL HAP POLLUTANT**

HISTORICAL COMPLIANCE AIR PROGRAM LEVEL

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0703**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1002**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0901**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1401**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1202**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0902**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1403**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1302**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1104**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**

COMPLIANCE DATE (YYYQ): **1003**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0804**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1004**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0604**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1304**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0702**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1102**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0801**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0904**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1204**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1203**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0704**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1303**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1101**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1001**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0903**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1201**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0701**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1103**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1301**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **1402**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0802**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

AIR PROGRAM: **MACT (SECTION 63 NESHAPS)**
COMPLIANCE DATE (YYYQ): **0803**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE - INSPECTION**

Back to Report Summary

MAP ID# 2

Distance from Property: 0.017 mi. (90 ft.) E
Elevation: 4,226 ft. (Equal to TP)

SITE INFORMATION

ID#: **199141**

NAME: **15 SOUTH JEREMY STREET_HERITAGE FORGE**

ADDRESS: **15 SOUTH JEREMY STREET 16 SOUTH 800 WEST**
SALT LAKE CITY, UT 84104

TYPE FUNDING: **HAZARDOUS**

PREDOMINANT PAST USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**0.98**

FUTURE USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**NOT REPORTED**

PROPERTY HIGHLIGHT:
NOT REPORTED

PROPERTY SIZE (Acres): **0.98**

CURRENT OWNER: **JEREMY LLC**

PROPERTY DESCRIPTION/ FORMER USE:
THE SITE IS AN APPROXIMATELY .98 ACRE PARCEL WITH A 6,192 SQ FT BUILDING. THE SITE WAS UNDEVELOPED UNTIL 1957 WHEN THE EXISTING BUILDING WAS CONSTRUCTED. THE SITE WAS OCCUPIED BY GREATER MOUNTAIN CHEMICAL COMPANY OF UTAH FOR APPROXIMATELY 10 YEARS. THE SO

CONTAMINATE(S): **ASBESTOS, VOCS, LEAD, OTHER METALS**

CONTAMINATE(S) CLEANED UP: **NOT REPORTED**

MEDIA(S) AFFECTED: **SOIL, GROUND WATER**

MEDIA(S) CLEANED UP: **NOT REPORTED**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE II ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **8/27/2015 0:00**

ASSESSMENT COMPLETION DATE: **1/6/2016 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE I ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **4/17/2015 0:00**

ASSESSMENT COMPLETION DATE: **8/18/2015 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

Back to Report Summary

MAP ID# 2

Distance from Property: 0.019 mi. (100 ft.) N
Elevation: 4,226 ft. (Equal to TP)

SITE INFORMATION

ID#: **199721**

NAME: **8 SOUTH JEREMY STREET - CROWN PLATING**

ADDRESS: **8 SOUTH JEREMY STREET**
SALT LAKE CITY, UT 84104

TYPE FUNDING: **HAZARDOUS**

PREDOMINANT PAST USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**0.13**

FUTURE USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**NOT REPORTED**

PROPERTY HIGHLIGHT:
NOT REPORTED

PROPERTY SIZE (Acres): **0.13**

CURRENT OWNER: **JEREMY HOLDINGS, INC.**

PROPERTY DESCRIPTION/ FORMER USE:
THIS PARCEL IS PART OF A COMBINED SITE UNDER THE SAME OWNERSHIP. (COMBINED WITH PARCEL 15-02-24-006, ACRES ID 199722). IN TOTAL, THE TWO SITES ARE .35 ACRES UNDER THE SAME OWNER. AN APPROXIMATELY 9,250 SQ FT INDUSTRIAL BUILDING COVERS BOTH PARCELS. A SMA

CONTAMINATE(S): **VOCS, OTHER METALS, OTHER**

CONTAMINATE(S) CLEANED UP: **NOT REPORTED**

MEDIA(S) AFFECTED: **SOIL, GROUND WATER**

MEDIA(S) CLEANED UP: **NOT REPORTED**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE II ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **10/19/2015 0:00**

ASSESSMENT COMPLETION DATE: **2/8/2016 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE I ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **4/17/2015 0:00**

ASSESSMENT COMPLETION DATE: **8/31/2015 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

Back to Report Summary

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

SITE INFORMATION

ID#: **199722**

NAME: **14 SOUTH JEREMY STREET - CROWN PLATING**

ADDRESS: **14 SOUTH JEREMY STREET**
SALT LAKE CITY, UT 84104

TYPE FUNDING: **HAZARDOUS**

PREDOMINANT PAST USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**0.22**

FUTURE USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**NOT REPORTED**

PROPERTY HIGHLIGHT:
NOT REPORTED

PROPERTY SIZE (Acres): **0.22**

CURRENT OWNER: **JEREMY HOLDING**

PROPERTY DESCRIPTION/ FORMER USE:
THIS PARCEL IS PART OF A COMBINED SITE UNDER THE SAME OWNERSHIP. (COMBINED WITH PARCEL 15-02-24-009 ACRES ID 199721). IN TOTAL, THE TWO SITES ARE .35 ACRES UNDER THE SAME OWNER. AN APPROXIMATELY 9,250 SQ FT INDUSTRIAL BUILDING COVERS BOTH PARCELS. A SMAL

CONTAMINATE(S): **ASBESTOS, VOCS, OTHER METALS, OTHER**

CONTAMINATE(S) CLEANED UP: **NOT REPORTED**

MEDIA(S) AFFECTED: **SOIL, GROUND WATER**

MEDIA(S) CLEANED UP: **NOT REPORTED**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE II ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **10/19/2015 0:00**

ASSESSMENT COMPLETION DATE: **2/8/2016 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE I ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **4/17/2015 0:00**

ASSESSMENT COMPLETION DATE: **8/31/2015 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

Back to Report Summary

MAP ID# 2

Distance from Property: 0.018 mi. (95 ft.) S
Elevation: 4,226 ft. (Equal to TP)

SITE INFORMATION

ID#: **209762**

NAME: **42 SOUTH JEREMY_LIBERTY AUTO**

ADDRESS: **42 SOUTH JEREMY STREET**
SALT LAKE CITY, UT 84104

TYPE FUNDING: **PETROLEUM**

PREDOMINANT PAST USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**0.16**

FUTURE USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**NOT REPORTED**

PROPERTY HIGHLIGHT:
NOT REPORTED

PROPERTY SIZE (Acres): **0.16**

CURRENT OWNER: **MR. GERMAN LOPEZ, ET AL.**

PROPERTY DESCRIPTION/ FORMER USE:
THE SITE HAS ONE 4,800 SQUARE FOOT BUILDING USED FOR AUTOMOTIVE REPAIR AND RESIDENTIAL PURPOSES. THE EAST SECTION IS OCCUPIED BY LIBERTY AUTO, THE CENTER IS RESIDENTIAL, AND THE WEST SECTION IS OCCUPIED BY L AUTO WORK. THE SITE WAS ORIGINALLY DEVELOPED IN

CONTAMINATE(S): **NOT REPORTED**

CONTAMINATE(S) CLEANED UP: **NOT REPORTED**

MEDIA(S) AFFECTED: **NOT REPORTED**

MEDIA(S) CLEANED UP: **NOT REPORTED**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE I ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **11/24/2015 0:00**

ASSESSMENT COMPLETION DATE: **1/6/2016 0:00**

CLEANUP REQUIRED: **NO**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **NO**

Back to Report Summary

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

HANDLER IDENTIFICATION: **UTD009086372**
SITENAME: **CROWN PLATING CO. INC.**
ADDRESS: **14 JEREMY STREET**
SALT LAKE CITY, UT 84104
REPORTED YEARS: **2005, 2003, 2001**

WASTE INFORMATION

LAST REPORTED YEAR: **2005**

MANAGEMENT LOCATION: **OFFSITE**
SOURCE CODE DESCRIPTION:
PLATING AND PHOSPHATING (ELECTRO- OR NON-ELECTROPLATING OR PHOSPHATING)
FORM CODE DESCRIPTION:
W505 - METAL BEARING SLUDGES (INCLUDING PLATING SLUDGE) NOT CONTAINING CYANIDES
MANAGEMENT DESCRIPTION:
H123 - SETTLING OR CLARIFICATION (AS THE MAJOR COMPONENT OF TREATMENT; NOT REPORTABLE AS H071-H083)
GENERATOR ID INCLUDED IN NBR: **NO**
GENERATOR WASTE STREAM INCLUDED IN NBR: **NO**
QUANITITY GENERATED IN TONS: **1.2**
MANAGER ID INCLUDED IN NBR: **NO**
MANAGER WASTE STREAM INCLUDED IN NBR: **NO**
QUANITITY MANAGED IN TONS: **0**
SHIPPER ID INCLUDED IN NBR: **NO**
SHIPPER WASTE STREAM INCLUDED IN NBR: **NO**
SHIPPER ID: **UTD009086372**
SHIPPER STATE: **UTAH**
QUANITITY SHIPPED IN TONS: **.9**
RECEIVER ID INCLUDED IN NBR: **NO**
RECEIVER WASTE STREAM INCLUDED IN NBR: **NO**
RECEIVER ID: **TXD981552425**
RECEIVER STATE: **TEXAS**
QUANITITY RECEIVED IN TONS: **0**
FEDERAL WASTE: **YES**
WASTEWATER CHARACTERISTIC INDICATOR: **YES**
WASTE DESCRIPTION SIC: **332813 -**
WASTE MINIMIZATION CODE DESCRIPTION:
NOT REPORTED - NOT REPORTED
WASTE CODE DESCRIPTION: **F006 - WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS EXCEPT FROM THE FOLLOWING PROCESSES: (1) SULFURIC ACID ANODIZING OF ALUMINUM; (2) TIN PLATING ON CARBON STEEL; (3) ZINC PLATING (SEGREGATED BASIS) ON CARBON STEEL; (4) ALUMINUM OR ZINC-ALUMINUM PLATING ON CARBON STEEL; (5) CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC, AND ALUMINUM PLATING ON CARBON STEEL; AND (6) CHEMICAL ETCHING AND MILLING OF ALUMINUM.**

Back to Report Summary

EPA Docket Data (DOCKETS)

MAP ID# 2

Distance from Property: 0.017 mi. (90 ft.) E
Elevation: 4,226 ft. (Equal to TP)

SITE INFORMATION

This is an Administrative Action

CIVIL COURT CASE: **08-1985-0031** CASE NAME: **CREED LABORATORIES & CHEMBRITE**
FILE DATE: **10/29/1985** CONCLUSION DATE: **12/18/1986**
FIRST DEFENDANT: **CHEMBRITE, INC.**
SECOND DEFENDANT: **CREED LABORATORIES**
DEFENDENTS FOR THIS CASE: **2** FACILITIES INVOLVED: **1**
LAWS: **FIFRA 12A FIFRA 12A 40CFR 167.5C**
VIOLATIONS: **NOT REPORTED**
POLLUTANTS: **NOT REPORTED**
FIRST INVOLVED FACILITY NAME: **CREED LABORATORIES & MANUFACTU**
ADDRESS: **SALT LAKE CITY**
CITY: **15 JEREMY**
COUNTY: **NOT REPORTED**
STATE: **UT** ZIP: **84104**
PENALTY ($) : **5000** SUPERFUND COST AWARDED ($) : **NONE**
JUDICIAL DISTRICT: **NOT REPORTED** DOCKET NUMBER: **FIFRA-86-165C**
RESULT: **CONSENT INSTRUMENT WITH PENALTY**

Back to Report Summary

Enforcement and Compliance History Information (ECHOR08)

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

UNIQUE ID: **110002159789**
REGISTRY ID: **110002159789**
NAME: **CROWN PLATING COMPANY**
ADDRESS: **14 JEREMY ST**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
FACILITY LINK: *Facility Detail Report*

Back to Report Summary

Enforcement and Compliance History Information (ECHOR08)

MAP ID# 2

Distance from Property: 0.017 mi. (90 ft.) E
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

UNIQUE ID: **110011678755**
REGISTRY ID: **110011678755**
NAME: **CREED LABORATORIES**
ADDRESS: **15 JERMEY STREET**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
FACILITY LINK: *Facility Detail Report*

Back to Report Summary

Emergency Response Notification System (ERNSUT)

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

INCIDENT INFORMATION

GSID#: **1148307**
NRC ID#: **1148307**
INCIDENT LOCATION: **NOT REPORTED**
INCIDENT ADDRESS: **14 JEREMY ST.**
SALT LAKE CITY, UT
INCIDENT COUNTY: **SALT LAKE**

INCIDENT DETAILS

INCIDENT DATE: **5/17/2016 9:30**
INCIDENT CAUSE: **OTHER**
INCIDENT TYPE: **FIXED**
INCIDENT OCCURED/DISCOVERED: **DISCOVERED**
INCIDENT DESCRIPTION: **CALLER STATED THAT WHEN CLEANING OUT THERE SUMP THEY ACCIDENTALLY RAISED THE PH LEVEL OF THE WATER IN THE SUMP 12.75. THIS WAS DISCOVERED AFTER THEY PUMPED THE WATER INTO THE SEWER SYSTEM WHICH IS APART OF THERE NORMAL PROCESS. THEY CONTACTED SALT LAKE CITY WASTE WATER WHO INFORMED THEM TO CONTACT THE NATIONAL RESPONSE CENTER.**

RESPONSIBLE PARTY

RESPONSIBLE COMPANY: **CROWN PLATING COMPANY INCORPORATED**
ADDRESS: **ADDRESS NOT REPORTED**
SALT LAKE CITY UT
RESPONSIBLE COMPANY ORGANIZATION TYPE: **PRIVATE ENTERPRISE**

MATERIALS INVOLVED

CHRIS CODE: **NCC**
MATERIAL REACHED WATER: **YES**
WATER AMOUNT: **500 GALLON(S)**
MATERIAL RELEASED/AMOUNT: **HIGH PH WATER OF 12.75 / 500 GALLON(S)**

OTHER MATERIALS INVOLVED

- NO OTHER MATERIALS INVOLVED -

REMEDIAL ACTION

REMEDIAL ACTION: **IMMEDIATELY CORRECTED PH WITH SULFURIC ACID**

Back to Report Summary

Facility Registry System (FRSUT)

MAP ID# 2

Distance from Property: 0.017 mi. (90 ft.) E
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110002154588**

NAME: **CHEMBRITE**

LOCATION ADDRESS: **15 S 840 W**
SALT LAKE CITY, UT 84104-1132

COUNTY: **SALT LAKE**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

CHEMBRITE

PROGRAM/S LISTED FOR THIS FACILITY

CIM - UTAH - COMMON IDENTIFIER MECHANISM

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)

NO SIC DATA REPORTED

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)

NO NAICS DATA REPORTED

Back to Report Summary

Facility Registry System (FRSUT)

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110002159789**

NAME: **CROWN PLATING CO, INC**

LOCATION ADDRESS: **14 JEREMY ST**
SALT LAKE CITY, UT 84104-1131

COUNTY: **SALT LAKE**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

CROWN PLATING CO. INC.
CROWN PLATING CO, INC
CROWN PLATING COMPANY
CROWN PLATING COMPANY INCORPORATED
CROWN PLATING CO., INC.
CROWN PLATING, INC.
CROWN PLATING CO

PROGRAM/S LISTED FOR THIS FACILITY

AIRS/AFS - AEROMETRIC INFORMATION RETRIEVAL SYSTEM / AIRS FACILITY SYSTEM
NPDES - NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
NCDB - NATIONAL COMPLIANCE DATABASE SYSTEM
EIS - EIS
RCRAINFO - RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM
CIM - UTAH - COMMON IDENTIFIER MECHANISM
ICIS - INTEGRATED COMPLIANCE INFORMATION SYSTEM
BR - BR

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)

3471 - ELECTROPLATING, PLATING, POLISHING, ANODIZING, AND COLORING
9999 - NONCLASSIFIABLE ESTABLISHMENTS

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)

332813 - ELECTROPLATING, PLATING, POLISHING, ANODIZING, AND COLORING.
332813 - ELECTROPLATING, PLATING, POLISHING, ANODIZING, AND COLORING.
332813 - ELECTROPLATING, PLATING, POLISHING, ANODIZING, AND COLORING.
332813 - ELECTROPLATING, PLATING, POLISHING, ANODIZING, AND COLORING.
332813 - ELECTROPLATING, PLATING, POLISHING, ANODIZING, AND COLORING.
332813 - ELECTROPLATING, PLATING, POLISHING, ANODIZING, AND COLORING.
332813 - ELECTROPLATING, PLATING, POLISHING, ANODIZING, AND COLORING.

Back to Report Summary

MAP ID# 2

Distance from Property: 0.017 mi. (90 ft.) E
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110011678755**

NAME: **CREED LABORATORIES**

LOCATION ADDRESS: **15 JERMEY STREET**
SALT LAKE CITY, UT 84104-1132

COUNTY: **SALT LAKE**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

CREED LABORATORIES
CHEMBRITE CREED LABS
CHEMBRITE
CHEMBRITE INC
CHEM BRITE INC
CREED LABORATORIES & MFG
CHEMBRITE INCORPORATED

PROGRAM/S LISTED FOR THIS FACILITY

CIM - UTAH - COMMON IDENTIFIER MECHANISM
RCRAINFO - RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM
NCDB - NATIONAL COMPLIANCE DATABASE SYSTEM
ICIS - INTEGRATED COMPLIANCE INFORMATION SYSTEM

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)

2842 - SPECIALTY CLEANING, POLISHING, AND SANITATION PREPARATIONS

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)

NO NAICS DATA REPORTED

Back to Report Summary

Facility Registry System (FRSUT)

MAP ID# 2

Distance from Property: 0.018 mi. (95 ft.) S
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110067367334**

NAME: **42 SOUTH JEREMY_LIBERTY AUTO**

LOCATION ADDRESS: **42 SOUTH JEREMY STREET**
SALT LAKE CITY, UT 84104

COUNTY: **SALT LAKE COUNTY**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

42 SOUTH JEREMY_LIBERTY AUTO

PROGRAM/S LISTED FOR THIS FACILITY

ACRES - ASSESSMENT, CLEANUP AND REDEVELOPMENT EXCHANGE SYSTEM

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)

NO SIC DATA REPORTED

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)

NO NAICS DATA REPORTED

Back to Report Summary

Facility Registry System (FRSUT)

MAP ID# 2

Distance from Property: 0.017 mi. (90 ft.) E
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110069239504**

NAME: **15 SOUTH JEREMY STREET_HERITAGE FORGE**

LOCATION ADDRESS: **15 SOUTH JEREMY STREET**
SALT LAKE CITY, UT 84104

COUNTY: **SALT LAKE COUNTY**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

15 SOUTH JEREMY STREET_HERITAGE FORGE

PROGRAM/S LISTED FOR THIS FACILITY

ACRES - ASSESSMENT, CLEANUP AND REDEVELOPMENT EXCHANGE SYSTEM

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)

NO SIC DATA REPORTED

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)

NO NAICS DATA REPORTED

Back to Report Summary

MAP ID# 2

Distance from Property: 0.019 mi. (100 ft.) N
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110069239513**

NAME: **8 SOUTH JEREMY STREET - CROWN PLATING**

LOCATION ADDRESS: **8 SOUTH JEREMY STREET**
SALT LAKE CITY, UT 84104

COUNTY: **SALT LAKE COUNTY**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

8 SOUTH JEREMY STREET - CROWN PLATING

PROGRAM/S LISTED FOR THIS FACILITY

ACRES - ASSESSMENT, CLEANUP AND REDEVELOPMENT EXCHANGE SYSTEM

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)

NO SIC DATA REPORTED

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)

NO NAICS DATA REPORTED

Back to Report Summary

Facility Registry System (FRSUT)

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110069239522**

NAME: **14 SOUTH JEREMY STREET - CROWN PLATING**

LOCATION ADDRESS: **14 SOUTH JEREMY STREET**
SALT LAKE CITY, UT 84104

COUNTY: **SALT LAKE COUNTY**

EPA REGION: **08**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

14 SOUTH JEREMY STREET - CROWN PLATING

PROGRAM/S LISTED FOR THIS FACILITY

ACRES - ASSESSMENT, CLEANUP AND REDEVELOPMENT EXCHANGE SYSTEM

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)

NO SIC DATA REPORTED

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)

NO NAICS DATA REPORTED

Back to Report Summary

MAP ID# 2

Distance from Property: 0.017 mi. (90 ft.) E
Elevation: 4,226 ft. (Equal to TP)

SITE INFORMATION

GEOSEARCH ID: **110011678755**
REGISTRY ID: **110011678755**
NAME: **CREED LABORATORIES**
ADDRESS: **15 JEREMY ST**
SALT LAKE CITY UT 84104-1132
STANDARD INDUSTRIAL CLASSIFICATION: **SPECIALTY CLEANING, POLISHING, AND SANITATION PREPARATIONS**

REGIONAL DOCKETS

FIFRA-86-165C

RELATED ACTIVITIES

- NO RELATED ACTIVITIES REPORTED

VIOLATIONS

- NO VIOLATIONS REPORTED

CASE IDENTIFIER

CASE NUMBER: **08-1985-0031**
FISCAL YEAR: **1985**
CASE NAME: **CREED LABORATORIES & CHEMBRITE, INC.**
ACTIVITY TYPE: **ADMINISTRATIVE - FORMAL**
ACTIVITY STATUS: **CLOSED**
ACTIVITY STATUS DATE: **4/5/1989**
LEAD: **EPA**
CASE STATUS DATE: **4/5/1989**
DOJ DOCKET NUMBER: **NOT REPORTED**
ENFORCEMENT OUTCOME: **FINAL ORDER WITH PENALTY**
MULTIMEDIA FLAG: **N**
ENFORCEMENT SUMMARY:

-MISREPRESENTATION REGARDING THE PRESENCE OF BROMINE IN THE TRI-HALO PRODUCT. - CHEMBRITE'S PASTED ITS LABEL OVER THE OLIN NAME. -SALE OF MISBRANDED PESTICEDE. -SALE OF OLIN PACE STICKS UNDER RESPONDENT'S OWN NAME. -PASTED ITS PRODUCT NAME OVER THE CHEM TAB PRODUCT. -FAILURE TO FILE WITH THE EPA ITS 1984 PESTICIDES REPORT.

ENFORCEMENT TYPE

ENFORCEMENT TYPE: **FIFRA 14 AO FOR COMP AND PENALTIES (OLD)**

POLLUTANTS CITED

POLLUTANT DESCRIPTION: **NONE**

Back to Report Summary

Integrated Compliance Information System National Pollutant Discharge Elimination System (ICISNPDES)

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **UTR000378INPDES**
NPDES ID: **UTR000378** FACILITY #: **110002159789**
NAME: **CROWN PLATING CO, INC**
PHYSICAL ADDRESS: **14 JEREMY ST.**
SALT LAKE CITY UT 84104
COUNTY: **SALT LAKE**
FACILITY TYPE: **PRIVATELY OWNED FACILITY**
IMPAIRED WATERS: **303(D) LISTED**

STANDARD INDUSTRIAL CLASSIFICATION

3471-PLATING AND POLISHING

PERMITS

FACILITY TYPE INDICATOR: **NON-POTABLE WATER**
PERMIT TYPE: **GENERAL PERMIT COVERED FACILITY**
MAJOR MINOR FACILITY: **MINOR DISCHARGER**
PERMIT STATUS: **EFFECTIVE**
WATER BODY: **GROUND WATER**
PERMIT NAME: **CROWN PLATING CO. INC.**
AGENCY TYPE: **STATE**
ORIGINAL ISSUE DATE: **8/4/2004**
ISSUE DATE: **1/1/2016**
ISSUING AGENCY: **UTAH DEQ DIVISION OF WATER QUALITY**
EFFECTIVE DATE: **1/1/2016**
EXPIRATION DATE: **12/31/2020**
RETIREMENT DATE: **NOT REPORTED**
TERMINATION DATE: **NOT REPORTED**
PERMIT COMPLIANCE STATUS: **NOT REPORTED**
PERMIT SUBJECT TO DMR RUN: **NOT REPORTED**
REPORTABLE NONCOMPLIANCE TRACKING IS ON: **YES**

INSPECTIONS

- NO INSPECTIONS REPORTED -

HISTORIC COMPLIANCE

- NO HISTORIC COMPLIANCE REPORTED -

SINGLE EVENT VIOLATIONS

- NO SINGLE EVENT VIOLATIONS REPORTED -

FORMAL ENFORCEMENT ACTIONS

- NO FORMAL ENFORCEMENT ACTIONS REPORTED -

EFFLUENT VIOLATIONS

- NOT REPORTED -

EFFLUENT VIOLATIONS contd..

- NOT REPORTED -

EFFLUENT VIOLATIONS contd..

- NOT REPORTED -

Back to Report Summary

Integrated Compliance Information System National Pollutant Discharge Elimination System (ICISNPDES)

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **UTU000354INPDES**
NPDES ID: **UTU000354** FACILITY #: **110002159789**
NAME: **CROWN PLATING, INC.**
PHYSICAL ADDRESS: **14 JEREMY STREET 14 JEREMY STREET**
SALT LAKE CITY UT 84104
COUNTY: **SALT LAKE**
FACILITY TYPE: **UNKNOWN**
IMPAIRED WATERS: **303(D) LISTED**

STANDARD INDUSTRIAL CLASSIFICATION

9999-NONCLASSIFIABLE ESTABLISHMENTS

PERMITS

FACILITY TYPE INDICATOR: **NOT REPORTED**
PERMIT TYPE: **UNPERMITTED FACILITY**
MAJOR MINOR FACILITY: **UNPERMITTED FACILITIES**
PERMIT STATUS: **NOT REPORTED**
WATER BODY: **NOT REPORTED**
PERMIT NAME: **NOT REPORTED**
AGENCY TYPE: **STATE**
ORIGINAL ISSUE DATE: **NOT REPORTED**
ISSUE DATE: **NOT REPORTED**
ISSUING AGENCY: **NOT REPORTED**
EFFECTIVE DATE: **NOT REPORTED**
EXPIRATION DATE: **NOT REPORTED**
RETIREMENT DATE: **NOT REPORTED**
TERMINATION DATE: **NOT REPORTED**
PERMIT COMPLIANCE STATUS: **NOT REPORTED**
PERMIT SUBJECT TO DMR RUN: **NOT REPORTED**
REPORTABLE NONCOMPLIANCE TRACKING IS ON: **YES**

INSPECTIONS

MONITOR TYPE: **EVALUATION**
LEAD AGENCY: **STATE**
ACTUAL BEGIN DATE: **NOT REPORTED**
ACTUAL END DATE: **07/18/2005**

HISTORIC COMPLIANCE

- NO HISTORIC COMPLIANCE REPORTED -

SINGLE EVENT VIOLATIONS

- NO SINGLE EVENT VIOLATIONS REPORTED -

FORMAL ENFORCEMENT ACTIONS

- NO FORMAL ENFORCEMENT ACTIONS REPORTED -

EFFLUENT VIOLATIONS

- NOT REPORTED -

EFFLUENT VIOLATIONS contd..

- NOT REPORTED -

EFFLUENT VIOLATIONS contd..

- NOT REPORTED -

Back to Report Summary

National Pollutant Discharge Elimination System (NPDESR08)

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

NPDES ID#: **UTU000354**
NAME: **CROWN PLATING, INC.**
PHYSICAL ADDRESS: **14 JEREMY STREET 14 JEREMY STREET**
SALINA, UT 84104
PERMITTYPE / ISSUE DATE: **UNPERMITTED / 07/18/05**
FACILITY TYPE: **INDUSTRIAL**
STANDARD INDUSTRIAL CLASSIFICATION: **NONCLASSIFIABLE ESTABLISHMENTS**
RECEIVING WATER: **NOT REPORTED**

Back to Report Summary

Resource Conservation & Recovery Act - Generator (RCRAGR08)

MAP ID# 2

Distance from Property: 0.007 mi. (37 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

EPA ID#: **UTD009086372**
NAME: **CROWN PLATING CO. INC.**
ADDRESS: **14 JEREMY STREET**
SALT LAKE CITY, UT 84104
CONTACT NAME: **JOSEPH L BROSCHINSKY**
CONTACT ADDRESS: **14 JEREMY STREET**
SALT LAKE CITY UT 84104
CONTACT PHONE: **801-364-0201**
NON-NOTIFIER: **NOT A NON-NOTIFIER**
DATE RECEIVED BY AGENCY: **06/11/2013**

OWNER TYPE: **PRIVATE**
OWNER NAME: **JOSEPH L. BROSCHINSKY**
OPERATOR TYPE: **PRIVATE**
OPERATOR NAME: **JOSEPH BROSCHINSKY**

CERTIFICATION

CERTIFICATION NAME:	CERTIFICATION TITLE:	CERTIFICATION SIGNED DATE:
JOSEPH L BROSCHINSKY	**PRESIDENT**	**06/11/2013**
JOSEPH L BROSCHINSKY	**PRESIDENT**	**03/02/2006**
JOSEPH L BROSCHINSKY	**PRESIDENT**	**03/03/2004**
JOSEPH BROSCHINSKY	**PRESIDENT**	**05/13/2002**

INDUSTRY CLASSIFICATION (NAICS)

332813 - ELECTROPLATING, PLATING, POLISHING, ANODIZING, AND COLORING

CURRENT ACTIVITY INFORMATION

GENERATOR STATUS: **SMALL QUANTITY GENERATOR** LAST UPDATED DATE: **06/11/2013**
SUBJECT TO CORRECTIVE ACTION UNIVERSE: **NO**
TDSFs POTENTIALLY SUBJECT TO CORRECTIVE ACTION UNDER 3004 (u)/(v) UNIVERSE: **NO**
TDSFs ONLY SUBJECT TO CORRECTIVE ACTION UNDER DISCRETIONARY AUTHORITIES UNIVERSE: **NO**
NON TSDFs WHERE RCRA CORRECTIVE ACTION HAS BEEN IMPOSED UNIVERSE: **NO**
CORRECTIVE ACTION WORKLOAD UNIVERSE: **NO**

IMPORTER: **NO**
MIXED WASTE GENERATOR: **NO**
RECYCLER: **NO**
TRANSPORTER: **NO**
ONSITE BURNER EXEMPTION: **NO**
FURNACE EXEMPTION: **NO**
USED OIL REFINER: **NO**
USED OIL TRANSFER FACILITY: **NO**

UNDERGROUND INJECTION: **NO**
UNIVERSAL WASTE DESTINATION FACILITY: **NO**
TRANSFER FACILITY: **NO**
USED OIL FUEL BURNER: **NO**
USED OIL PROCESSOR: **NO**
USED OIL FUEL MARKETER TO BURNER: **NO**
SPECIFICATION USED OIL MARKETER: **NO**
USED OIL TRANSPORTER: **NO**

COMPLIANCE, MONITORING AND ENFORCEMENT INFORMATION

EVALUATIONS

11/18/2013	**CEI**	**COMPLIANCE EVALUATION INSPECTION ON-SITE**
03/08/2007	**CEI**	**COMPLIANCE EVALUATION INSPECTION ON-SITE**
09/11/2001	**CEI**	**COMPLIANCE EVALUATION INSPECTION ON-SITE**
06/11/1990	**CEI**	**COMPLIANCE EVALUATION INSPECTION ON-SITE**
02/17/1988	**CEI**	**COMPLIANCE EVALUATION INSPECTION ON-SITE**
02/17/1988	**FCI**	**FOCUSED COMPLIANCE INSPECTION**

03/12/1986	FCI FOCUSED COMPLIANCE INSPECTION
06/05/1985	CEI COMPLIANCE EVALUATION INSPECTION ON-SITE

VIOLATIONS

03/08/2007	265.C TSD IS-PREPAREDNESS AND PREVENTION
03/08/2007	265.I TSD IS-CONTAINER USE AND MANAGEMENT
06/11/1990	262.A GENERATORS - GENERAL
06/11/1990	268.A LDR - GENERAL
02/17/1988	262.A GENERATORS - GENERAL
03/12/1986	262.A GENERATORS - GENERAL

ENFORCEMENTS

06/21/2007	120 WRITTEN INFORMAL
02/29/1988	120 WRITTEN INFORMAL
03/17/1986	120 WRITTEN INFORMAL

HAZARDOUS WASTE

D002	CORROSIVE WASTE
D006	CADMIUM
D007	CHROMIUM
F006	WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS EXCEPT FROM THE FOLLOWING PROCESSES: (1) SULFURIC ACID ANODIZING OF ALUMINUM; (2) TIN PLATING ON CARBON STEEL; (3) ZINC PLATING (SEGREGATED BASIS) ON CARBON STEEL; (4) ALUMINUM OR ZINC-ALUMINUM PLATING ON CARBON STEEL; (5) CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC, AND ALUMINUM PLATING ON CARBON STEEL; AND (6) CHEMICAL ETCHING AND MILLING OF ALUMINUM.
F008	PLATING BATH RESIDUES FROM THE BOTTOM OF PLATING BATHS FROM ELECTROPLATING OPERATIONS IN WHICH CYANIDES ARE USED IN THE PROCESS.
F009	SPENT STRIPPING AND CLEANING BATH SOLUTIONS FROM ELECTROPLATING OPERATIONS IN WHICH CYANIDES ARE USED IN THE PROCESS.
F999	

UNIVERSAL WASTE

WASTE TYPE:	ACCUMULATED WASTE ON-SITE:	GENERATED WASTE ON-SITE:	SOURCE TYPE:
BATTERIES	NO	NO	ANNUAL/BIENNIAL REPORT
BATTERIES	UNKNOWN	UNKNOWN	ANNUAL/BIENNIAL REPORT
LAMPS	NO	NO	ANNUAL/BIENNIAL REPORT
LAMPS	UNKNOWN	UNKNOWN	ANNUAL/BIENNIAL REPORT
PESTICIDES	NO	NO	ANNUAL/BIENNIAL REPORT
PESTICIDES	UNKNOWN	UNKNOWN	ANNUAL/BIENNIAL REPORT
MERCURY CONTAINING EQUIPMENT	NO	NO	ANNUAL/BIENNIAL REPORT
MERCURY CONTAINING EQUIPMENT	UNKNOWN	UNKNOWN	ANNUAL/BIENNIAL REPORT

CORRECTIVE ACTION AREA - NO CORRECTIVE ACTION AREA INFORMATION REPORTED -

CORRECTIVE ACTION EVENT - NO CORRECTIVE ACTION EVENT REPORTED -

Back to Report Summary

Resource Conservation & Recovery Act - Non-Generator (RCRANGR08)

MAP ID# 2

Distance from Property: 0.017 mi. (90 ft.) E
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

EPA ID#: **UTD089326235**
NAME: **CREED LABORATORIES & MFG**
ADDRESS: **15 JEREMY**
SALT LAKE CITY, UT 84104
CONTACT NAME: **JOHN DOE**
CONTACT ADDRESS: **15 JEREMY**
SALT LAKE CITY UT 84104
CONTACT PHONE: **999-999-9999**
NON-NOTIFIER: **NOT A NON-NOTIFIER**
DATE RECEIVED BY AGENCY: **02/22/2007**
CERTIFICATION **- NO CERTIFICATION REPORTED -**
INDUSTRY CLASSIFICATION (NAICS) **- NO NAICS INFORMATION REPORTED -**

OWNER TYPE: **PRIVATE**
OWNER NAME: **CREED LABORATORIES & MFG.**
OPERATOR TYPE: **NOT REPORTED**
OPERATOR NAME: **NOT REPORTED**

CURRENT ACTIVITY INFORMATION

GENERATOR STATUS: **NON-GENERATOR** LAST UPDATED DATE: **03/07/2007**
SUBJECT TO CORRECTIVE ACTION UNIVERSE: **NO**
TDSFs POTENTIALLY SUBJECT TO CORRECTIVE ACTION UNDER 3004 (u)/(v) UNIVERSE: **NO**
TDSFs ONLY SUBJECT TO CORRECTIVE ACTION UNDER DISCRETIONARY AUTHORITIES UNIVERSE: **NO**
NON TSDFs WHERE RCRA CORRECTIVE ACTION HAS BEEN IMPOSED UNIVERSE: **NO**
CORRECTIVE ACTION WORKLOAD UNIVERSE: **NO**

IMPORTER: **NO**
MIXED WASTE GENERATOR: **NO**
RECYCLER: **NO**
TRANSPORTER: **NO**
ONSITE BURNER EXEMPTION: **NO**
FURNACE EXEMPTION: **NO**
USED OIL REFINER: **NO**
USED OIL TRANSFER FACILITY: **NO**

UNDERGROUND INJECTION: **NO**
UNIVERSAL WASTE DESTINATION FACILITY: **NO**
TRANSFER FACILITY: **NO**
USED OIL FUEL BURNER: **NO**
USED OIL PROCESSOR: **NO**
USED OIL FUEL MARKETER TO BURNER: **NO**
SPECIFICATION USED OIL MARKETER: **NO**
USED OIL TRANSPORTER: **NO**

COMPLIANCE, MONITORING AND ENFORCEMENT INFORMATION

EVALUATIONS

11/21/1985	**CEI**	**COMPLIANCE EVALUATION INSPECTION ON-SITE**
11/21/1985	**FCI**	**FOCUSED COMPLIANCE INSPECTION**

VIOLATIONS

11/21/1985	**262.A**	**GENERATORS - GENERAL**

ENFORCEMENTS

03/26/1986	**120**	**WRITTEN INFORMAL**

HAZARDOUS WASTE

- NO HAZARDOUS WASTE INFORMATION REPORTED -
UNIVERSAL WASTE **- NO UNIVERSAL WASTE REPORTED -**
CORRECTIVE ACTION AREA **- NO CORRECTIVE ACTION AREA INFORMATION REPORTED -**

CORRECTIVE ACTION EVENT **- NO CORRECTIVE ACTION EVENT REPORTED -**

Back to Report Summary

MAP ID# 2

Distance from Property: 0.017 mi. (90 ft.) E
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001520**
FACILITY ID: **4260**
FACILITY NAME: **CREED LABORATORIES**
ADDRESS: **15 S JEREMY ST**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **CREED LABORATORIES**
ADDRESS: **P O BOX 2983**
SALT LAKE CITY, UT 84104
OWNER PHONE: **(801) 595-1800**
TOTAL TANK: **2**
CLOSED TANK: **2**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **DIESEL**
TANK CAPACITY: **1500**
LAST USE: **6/1/1974**
DATE CLOSED: **9/11/1989**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **8/22/1969**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **2**
ALTERNATIVE TANK ID: **2**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **DIESEL**
TANK CAPACITY: **1500**
LAST USE: **6/1/1974**
DATE CLOSED: **9/11/1989**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **8/22/1969**

IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **UNKNOWN**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

Back to Report Summary

MAP ID# 3

Distance from Property: 0.024 mi. (127 ft.) SW
Elevation: 4,226 ft. (Equal to TP)

SITE INFORMATION

ID#: **209722**

NAME: **35 SOUTH 900 WEST_EL COMPADRE AND MUTUAL ENGINE REPAIR**

ADDRESS: **35 SOUTH 900 WEST**
SALT LAKE CITY, UT 84104

TYPE FUNDING: **PETROLEUM**

PREDOMINANT PAST USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**0.26**

FUTURE USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**0.26**

PROPERTY HIGHLIGHT:
NOT REPORTED

PROPERTY SIZE (Acres): **0.26**

CURRENT OWNER: **543 IRON ROSE PLACE, LLC**

PROPERTY DESCRIPTION/ FORMER USE:
FROM APPROXIMATELY 1898 UNTIL 1950 THE SITE WAS USED FOR RESIDENTIAL. A WARE HOUSE WAS CONSTRUCTED BEFORE 1962, AND ADDITIONS TO THE BUILDING WERE CONSTRUCTED IN 1970. THE CURRENT WAREHOUSE BUILDING WAS VISIBLE BY 1977. THE SITE BUILDING WAS ORIGINALLY OC

CONTAMINATE(S): **NOT REPORTED**

CONTAMINATE(S) CLEANED UP: **NOT REPORTED**

MEDIA(S) AFFECTED: **NOT REPORTED**

MEDIA(S) CLEANED UP: **NOT REPORTED**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE I ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **11/24/2015 0:00**

ASSESSMENT COMPLETION DATE: **1/8/2016 0:00**

CLEANUP REQUIRED: **NO**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **NO**

Back to Report Summary

MAP ID# 4

Distance from Property: 0.046 mi. (243 ft.) ESE
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **UTN000802419**
DERR ID: **UTN000802419**
FACILITY NAME: **BULLOUGH ASBESTOS**
ADDRESS: **800 WEST 50 SOUTH**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
PROJECT MANAGER: **NEIL TAYLOR**
CONTACT PHONE: **8015364102**
PROJECT DESCRIPTION: **NOT REPORTED**
EMERGENCY RESPONSE BRANCH: **NO**
NATIONAL PRIORITY LIST: **NO**
PROPOSED FOR NPL: **NO**
ARCHIVED FOR CERCLIS: **YES**

Back to Report Summary

Leaking Underground Storage Tanks (LUST)

MAP ID# 4

Distance from Property: 0.046 mi. (243 ft.) ESE
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001968LUST**
FACILITY ID: **4001968**
FACILITY NAME: **BULLOUGH INSULATION (FORMER)**
ADDRESS: **50 S 800 W**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **TIGER INVESTMENT LC**
ADDRESS: **171 E SHELLEY LOUISE DRIVE**
SANDY, UT 84070

FACILITY DETAILS

PROJECT MANAGER: **[ROBIN JENKINS]**
NOTIFICATION DATE: **12/1/1993**
CLOSED DATE: **5/9/1995**

CAUSE AND RELEASE

CAUSE OF RELEASE: **SPILL/OVERFILL**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **PERMANENT CLOSURE**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **NOT REPORTED**
METHOD DETERMINED: **GW CLOSURE RESULTS, B=2 & 3 UG/L**

Back to Report Summary

MAP ID# 4

Distance from Property: 0.046 mi. (243 ft.) ESE
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001968**
FACILITY ID: **4689**
FACILITY NAME: **BULLOUGH INSULATION (FORMER)**
ADDRESS: **50 S 800 W**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **TIGER INVESTMENT LC**
ADDRESS: **171 E SHELLEY LOUISE DRIVE**
SANDY, UT 84070
OWNER PHONE: **(801) 571-4200**
TOTAL TANK: **2**
CLOSED TANK: **2**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **4000**
LAST USE: **1/1/1983**
DATE CLOSED: **11/15/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **1/1/1980**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **UNKNOWN**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **2**
ALTERNATIVE TANK ID: **2**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **4000**
LAST USE: **1/1/1983**
DATE CLOSED: **11/15/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **1/1/1980**

IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **UNKNOWN**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

Back to Report Summary

Superfund Enterprise Management System Archived Site Inventory (SEMSARCH)

MAP ID# 4

Distance from Property: 0.046 mi. (243 ft.) ESE
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

EPA ID#: **UTN000802419**
SITE ID#: **0802419**
NAME: **BULLOUGH ASBESTOS**
ADDRESS: **800 WEST 50 SOUTH**
SALT LAKE CITY, UT 84104-1118
COUNTY: **SALT LAKE**
FEDERAL FACILITY: **NOT A FEDERAL FACILITY**
NPL: **NOT ON THE NPL**
NON NPL STATUS: **REMOVAL ONLY SITE (NO SITE ASSESSMENT WORK NEEDED)**
SEMS SEARCH: **CLICK HERE**

Below information was gathered from the prior NFRAP update completed in 10/2013 update:

ACTION	START DATE	COMPLETION DATE	RESPONSIBILITY
RS - REMOVAL ASSESSMENT	**8/26/2004**	**10/25/2004**	**EPA FUND**
VS - ARCHIVE SITE	**NOT REPORTED**	**4/12/2006**	**EPA IN-HOUSE**

ACTION DESCRIPTIONS

RS - (REMOVAL ASSESSMENT) - COLLECTING SITE CHARACTERISTICS TO DETERMINE WHETHER OR NOT A REMOVAL MUST BE PERFORMED.

VS - (ARCHIVE SITE) - THE DECISION IS MADE THAT NO FURTHER ACTIVITY IS PLANNED AT THE SITE.

Back to Report Summary

MAP ID# 5

Distance from Property: 0.067 mi. (354 ft.) N
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **4002172**
FACILITY ID: **4882**
FACILITY NAME: **SPRINT P.O.P.**
ADDRESS: **840 W SOUTH TEMPLE**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **SPRINT**
ADDRESS: **PO BOX 7994**
SHAWNEE MISSION, KS 66207
OWNER PHONE: **(913) 762-5957**
TOTAL TANK: **1**
CLOSED TANK: **NOT REPORTED**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **CURRENTLY IN USE**
SUBSTANCE: **DIESEL**
TANK CAPACITY: **1000**
LAST USE: **NOT REPORTED**
DATE CLOSED: **NOT REPORTED**
CLOSURE STATUS: **NOT REPORTED**
DATE INSTALLED: **9/1/1997**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **YES**
TANK MATERIAL: **FIBERGLASS REINFORCED PLASTIC**
TANK MODSDE: **DOUBLE-WALLED**
TANK RELEASE DETECTION: **DEFERRED**
PIPE MATERIAL: **FLEXIBLE PLASTIC**
PIPE MODDES: **DOUBLE-WALLED**
PIPE TYPE: **U.S. SUCTION**
PIPE RELEASE DETECTION: **DEFERRED**
PST FUND: **YES**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

Back to Report Summary

Leaking Underground Storage Tanks (LUST)

MAP ID# 6

Distance from Property: 0.071 mi. (375 ft.) SSW
Elevation: 4,224 ft. (Lower than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000119LUST**
FACILITY ID: **4000119**
FACILITY NAME: **CALDER BROS. CO, INC.**
ADDRESS: **79 S 900 W**
SALT LAKE CITY, UT 84124
COUNTY: **SALT LAKE**
OWNER NAME: **CALDER BROS CO INC**
ADDRESS: **PO BOX 50344**
PROVO, UT 84605

FACILITY DETAILS

PROJECT MANAGER: **HONG LEI TAO**
NOTIFICATION DATE: **3/24/1992**
CLOSED DATE: **1/12/2011**

CAUSE AND RELEASE

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **ENVIRONMENTAL ASSESSMENT**

Back to Report Summary

MAP ID# 6

Distance from Property: 0.071 mi. (375 ft.) SSW
Elevation: 4,224 ft. (Lower than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000119**
FACILITY ID: **2987**
FACILITY NAME: **CALDER BROS. CO, INC.**
ADDRESS: **79 S 900 W**
SALT LAKE CITY, UT 84124
COUNTY: **SALT LAKE**
OWNER NAME: **CALDER BROS CO INC**
ADDRESS: **PO BOX 50344**
PROVO, UT 84605
OWNER PHONE: **(801) 489-3888**
TOTAL TANK: **3**
CLOSED TANK: **3**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **10000**
LAST USE: **3/1/1991**
DATE CLOSED: **3/24/1992**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/8/1976**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **NO**

TANK ID: **2**
ALTERNATIVE TANK ID: **2**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **5000**
LAST USE: **3/1/1991**
DATE CLOSED: **3/24/1992**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/9/1971**

IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **NO**

TANK ID: **3**
ALTERNATIVE TANK ID: **3**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **DIESEL**
TANK CAPACITY: **5000**
LAST USE: **3/1/1991**
DATE CLOSED: **3/24/1992**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/9/1971**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **NO**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

Back to Report Summary

Resource Conservation & Recovery Act - Generator (RCRAGR08)

MAP ID# 7

Distance from Property: 0.105 mi. (554 ft.) E
Elevation: 4,225 ft. (Lower than TP)

FACILITY INFORMATION

EPA ID#: **UTR000004937**
NAME: **PROGRESSIVE PLATING INC.**
ADDRESS: **777 WEST SOUTH TEMPLE**
SALT LAKE CITY, UT 84104
CONTACT NAME: **JASON BROSCHINSKY**
CONTACT ADDRESS: **777 WEST SOUTH TEMPLE**
SALT LAKE CITY UT 84104
CONTACT PHONE: **801-533-9106**
NON-NOTIFIER: **NOT A NON-NOTIFIER**
DATE RECEIVED BY AGENCY: **04/28/1999**

OWNER TYPE: **PRIVATE**
OWNER NAME: **JASON BROSCHINSKY**
OPERATOR TYPE: **NOT REPORTED**
OPERATOR NAME: **NOT REPORTED**

CERTIFICATION **- NO CERTIFICATION REPORTED -**
INDUSTRY CLASSIFICATION (NAICS) **- NO NAICS INFORMATION REPORTED -**

CURRENT ACTIVITY INFORMATION

GENERATOR STATUS: **CONDITIONALLY EXEMPT SMALL QUANTITY GENERATOR** LAST UPDATED DATE: **09/15/2000**
SUBJECT TO CORRECTIVE ACTION UNIVERSE: **NO**
TDSFs POTENTIALLY SUBJECT TO CORRECTIVE ACTION UNDER 3004 (u)/(v) UNIVERSE: **NO**
TDSFs ONLY SUBJECT TO CORRECTIVE ACTION UNDER DISCRETIONARY AUTHORITIES UNIVERSE: **NO**
NON TSDFs WHERE RCRA CORRECTIVE ACTION HAS BEEN IMPOSED UNIVERSE: **NO**
CORRECTIVE ACTION WORKLOAD UNIVERSE: **NO**

IMPORTER: **NO**
MIXED WASTE GENERATOR: **NO**
RECYCLER: **NO**
TRANSPORTER: **NO**
ONSITE BURNER EXEMPTION: **NO**
FURNACE EXEMPTION: **NO**
USED OIL REFINER: **NO**
USED OIL TRANSFER FACILITY: **NO**

UNDERGROUND INJECTION: **NO**
UNIVERSAL WASTE DESTINATION FACILITY: **NO**
TRANSFER FACILITY: **NO**
USED OIL FUEL BURNER: **NO**
USED OIL PROCESSOR: **NO**
USED OIL FUEL MARKETER TO BURNER: **NO**
SPECIFICATION USED OIL MARKETER: **NO**
USED OIL TRANSPORTER: **NO**

COMPLIANCE, MONITORING AND ENFORCEMENT INFORMATION

EVALUATIONS **- NO EVALUATIONS REPORTED -**
VIOLATIONS **- NO VIOLATIONS REPORTED -**
ENFORCEMENTS **- NO ENFORCEMENTS REPORTED -**

HAZARDOUS WASTE

F006 **WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS EXCEPT FROM THE FOLLOWING PROCESSES: (1) SULFURIC ACID ANODIZING OF ALUMINUM; (2) TIN PLATING ON CARBON STEEL; (3) ZINC PLATING (SEGREGATED BASIS) ON CARBON STEEL; (4) ALUMINUM OR ZINC-ALUMINUM PLATING ON CARBON STEEL; (5) CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC, AND ALUMINUM PLATING ON CARBON STEEL; AND (6) CHEMICAL ETCHING AND MILLING OF ALUMINUM.**

UNIVERSAL WASTE **- NO UNIVERSAL WASTE REPORTED -**
CORRECTIVE ACTION AREA **- NO CORRECTIVE ACTION AREA INFORMATION REPORTED -**
CORRECTIVE ACTION EVENT **- NO CORRECTIVE ACTION EVENT REPORTED -**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 8

Distance from Property: 0.12 mi. (634 ft.) N
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4002469LUST**
FACILITY ID: **4002469**
FACILITY NAME: **FAMILY DOLLAR**
ADDRESS: **50 N 900 W**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **FAMILY DOLLAR**
ADDRESS: **50 N 900 W**
SALT LAKE CITY, UT 84104

FACILITY DETAILS

PROJECT MANAGER: **MORGAN ATKINSON**
NOTIFICATION DATE: **5/29/2012**
CLOSED DATE: **11/4/2013**

CAUSE RELEASE NO CAUSE AND RELEASE REPORTED

Back to Report Summary

Registered Underground Storage Tanks (RUST)

MAP ID# 8

Distance from Property: 0.12 mi. (634 ft.) N
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4002469**
FACILITY ID: **7731**
FACILITY NAME: **FAMILY DOLLAR**
ADDRESS: **50 N 900 W**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **FAMILY DOLLAR**
ADDRESS: **50 N 900 W**
SALT LAKE CITY, UT 84104
OWNER PHONE: **(801) 550-6958**
TOTAL TANK: **2**
CLOSED TANK: **2**

TANK INFORMATION NO TANK INFORMATION REPORTED

COMPLIANCE UST NO COMPLIANCE UST REPORTED

Back to Report Summary

MAP ID# 9

Distance from Property: 0.136 mi. (718 ft.) WSW
Elevation: 4,225 ft. (Lower than TP)

SITE INFORMATION

ID#: **199724**

NAME: **947 W FOLSOM - MARBLECAST**

ADDRESS: **947 WEST FOLSOM AVENUE**
SALT LAKE CITY, UT 84104

TYPE FUNDING: **HAZARDOUS & PETROLEUM**

PREDOMINANT PAST USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**0.02**	**0.13**

FUTURE USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**NOT REPORTED**

PROPERTY HIGHLIGHT:
NOT REPORTED

PROPERTY SIZE (Acres): **0.15**

CURRENT OWNER: **VASILIOS KARPOS**

PROPERTY DESCRIPTION/ FORMER USE:
THE SITE HAS A ONE STORY WAREHOUSE APPROXIMATELY 5,000 SQUARE FEET, BUILT IN APPROXIMATELY 1977. A SMALL PAVED PARKING AREA IS NORTH OF THE BUILDING, AND A SMALL STORAGE YARD IS SOUTH OF THE BUILDING. MARBLECAST PRODUCTS ARE THE CURRENT SITE OCCUPANTS. T

CONTAMINATE(S): **LEAD, OTHER METALS**

CONTAMINATE(S) CLEANED UP: **NOT REPORTED**

MEDIA(S) AFFECTED: **SOIL**

MEDIA(S) CLEANED UP: **NOT REPORTED**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE II ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **10/19/2015 0:00**

ASSESSMENT COMPLETION DATE: **2/3/2016 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE I ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **2/6/2015 0:00**

ASSESSMENT COMPLETION DATE: **8/31/2015 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

Back to Report Summary

MAP ID# 9

Distance from Property: 0.151 mi. (797 ft.) WSW
Elevation: 4,225 ft. (Lower than TP)

SITE INFORMATION

ID#: **199725**

NAME: **955 WEST FOLSOM - SWANER**

ADDRESS: **955 WEST FOLSOM AVENUE**
SALT LAKE CITY, UT 84104

TYPE FUNDING: **HAZARDOUS & PETROLEUM**

PREDOMINANT PAST USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**NOT REPORTED**

FUTURE USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**NOT REPORTED**

PROPERTY HIGHLIGHT:
NOT REPORTED

PROPERTY SIZE (Acres): **0.25**

CURRENT OWNER: **SWANER PROPERTIES, INC**

PROPERTY DESCRIPTION/ FORMER USE:
THE SITE IS APPROXIMATELY .25 ACRES, COMPRISED OF TWO PARCELS. IT HAS A 7,950 SQ FT WAREHOUSE, AND AN APPROXIMATELY 450 SQ FT, SECOND STORY STUDIO APARTMENT. A SMALL PAVED PARKING LOT IS NORTH OF THE BUILDING AND A PAVED STORAGE AREA IS LOCATED ON THE SOU

CONTAMINATE(S): **PETROLEUM, ASBESTOS**

CONTAMINATE(S) CLEANED UP: **NOT REPORTED**

MEDIA(S) AFFECTED: **SOIL**

MEDIA(S) CLEANED UP: **NOT REPORTED**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE II ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **10/16/2015 0:00**

ASSESSMENT COMPLETION DATE: **1/29/2016 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE I ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **3/31/2015 0:00**

ASSESSMENT COMPLETION DATE: **8/31/2015 0:00**

CLEANUP REQUIRED: **UNKNOWN**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **UNKNOWN**

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MAP ID# 10

Distance from Property: 0.142 mi. (750 ft.) W
Elevation: 4,225 ft. (Lower than TP)

SITE INFORMATION

ID#: **209761**

NAME: **25 SOUTH 1000 WEST_TIRE EXPRESS**

ADDRESS: **25 SOUTH 1000 WEST**
SALT LAKE CITY, UT 84104

TYPE FUNDING: **PETROLEUM**

PREDOMINANT PAST USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**0.5**

FUTURE USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**NOT REPORTED**	**NOT REPORTED**

PROPERTY HIGHLIGHT:
NOT REPORTED

PROPERTY SIZE (Acres): **0.5**

CURRENT OWNER: **FREEMAN VENTURES, LLC**

PROPERTY DESCRIPTION/ FORMER USE:
THE SITE COMPRISES TWO PARCELS, IMPROVED WITH ONE APPROXIMATELY 14,680 SQUARE FOR AUTOMOTIVE REPAIR. TIRE EXPRESS OCCUPIES THE WESTERN AREA OF THE SITE, AND THE REMAINDER OF THE BUILDING IS CURRENTLY OCCUPIED BY UP TO FIVE, SMALLER AUTOMOTIVE REPAIR TENAN

CONTAMINATE(S): **NOT REPORTED**

CONTAMINATE(S) CLEANED UP: **NOT REPORTED**

MEDIA(S) AFFECTED: **NOT REPORTED**

MEDIA(S) CLEANED UP: **NOT REPORTED**

TYPE OF BROWNFIELD GRANT: **ASSESSMENT**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE I ENVIRONMENTAL ASSESSMENT**

ASSESSMENT START DATE: **11/24/2015 0:00**

ASSESSMENT COMPLETION DATE: **2/5/2016 0:00**

CLEANUP REQUIRED: **NO**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **NO**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 11

Distance from Property: 0.144 mi. (760 ft.) SSE
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001850LUST**
FACILITY ID: **4001850**
FACILITY NAME: **JEREMY STREET LLC**
ADDRESS: **123 S JEREMY ST (840 W)**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **JEREMY STREET LLC**
ADDRESS: **663 S 600 W**
SALT LAKE CITY, UT 84101

FACILITY DETAILS

PROJECT MANAGER: **UST**
NOTIFICATION DATE: **4/9/2013**
CLOSED DATE: **4/10/2013**

CAUSE RELEASE NO CAUSE AND RELEASE REPORTED

Back to Report Summary

MAP ID# 11

Distance from Property: 0.144 mi. (760 ft.) SSE
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001850**
FACILITY ID: **4579**
FACILITY NAME: **JEREMY STREET LLC**
ADDRESS: **123 S JEREMY ST (840 W)**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **JEREMY STREET LLC**
ADDRESS: **663 S 600 W**
SALT LAKE CITY, UT 84101
OWNER PHONE: **(801) 455-8800**
TOTAL TANK: **2**
CLOSED TANK: **2**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **CURRENTLY IN USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **10000**
LAST USE: **NOT REPORTED**
DATE CLOSED: **NOT REPORTED**
CLOSURE STATUS: **NOT REPORTED**
DATE INSTALLED: **1/1/1971**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **IMPRESSED CURRENT CATHODIC PROTECTION**
TANK MODSDE: **LINED INTERIOR**
TANK RELEASE DETECTION: **AUTOMATIC TANK GAUGING**
PIPE MATERIAL: **BARE STEEL**
PIPE MODDES: **CATHODICALLY PROTECTED**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **YES**

TANK ID: **2**
ALTERNATIVE TANK ID: **2**
STATUS: **TEMPORARILY OUT OF USE**
SUBSTANCE: **DIESEL**
TANK CAPACITY: **1000**
LAST USE: **1/19/2011**
DATE CLOSED: **NOT REPORTED**
CLOSURE STATUS: **NOT REPORTED**
DATE INSTALLED: **1/1/1971**

IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **IMPRESSED CURRENT CATHODIC PROTECTION**
TANK MODSDE: **LINED INTERIOR**
TANK RELEASE DETECTION: **AUTOMATIC TANK GAUGING**
PIPE MATERIAL: **BARE STEEL**
PIPE MODDES: **CATHODICALLY PROTECTED**
PIPE TYPE: **SAFE SUCTION**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **YES**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

Back to Report Summary

Leaking Underground Storage Tanks (LUST)

MAP ID# 12

Distance from Property: 0.162 mi. (855 ft.) N
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001899LUST**
FACILITY ID: **4001899**
FACILITY NAME: **DAVID EARLY #5**
ADDRESS: **875 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **DAVID EARLY TIRE INC**
ADDRESS: **P O BOX 45340**
SALT LAKE CITY, UT 84145

FACILITY DETAILS

PROJECT MANAGER: **MELISSA TURCHI**
NOTIFICATION DATE: **1/24/1995**
CLOSED DATE: **11/20/2013**

CAUSE AND RELEASE

CAUSE OF RELEASE: **SITE WAS FORMERLY GAS STAION (CLOSED APROX. 1976);**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **ENVIRONMENTAL ASSESSMENT**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **DIESEL**
METHOD DETERMINED: **ON-SITE GW MONITORING WELL SHOWED GW CONTAMINATION**

Back to Report Summary

MAP ID# 12

Distance from Property: 0.162 mi. (855 ft.) N
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001899**
FACILITY ID: **4625**
FACILITY NAME: **DAVID EARLY #5**
ADDRESS: **875 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **DAVID EARLY TIRE INC**
ADDRESS: **P O BOX 45340**
SALT LAKE CITY, UT 84145
OWNER PHONE: **NOT REPORTED**
TOTAL TANK: **4**
CLOSED TANK: **4**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **USED OIL**
TANK CAPACITY: **500**
LAST USE: **6/1/1994**
DATE CLOSED: **9/9/1996**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **1/1/1970**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **MANUAL TANK GAUGING**
PIPE MATERIAL: **BARE STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **GRAVITY FEED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **2**
ALTERNATIVE TANK ID: **2**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **0**
LAST USE: **12/1/1977**
DATE CLOSED: **12/1/1977**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **1/1/1910**

IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **NOT LISTED**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **3**
ALTERNATIVE TANK ID: **3**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **0**
LAST USE: **12/1/1977**
DATE CLOSED: **12/1/1977**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **1/1/1910**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **NOT LISTED**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **4**
ALTERNATIVE TANK ID: **4**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **0**
LAST USE: **12/1/1977**
DATE CLOSED: **12/1/1977**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **1/1/1910**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**

TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **NOT LISTED**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

Back to Report Summary

Leaking Underground Storage Tanks (LUST)

MAP ID# 13

Distance from Property: 0.177 mi. (935 ft.) NNW
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000251LUST**
FACILITY ID: **4000251**
FACILITY NAME: **SMITH'S GAS & VIDEO**
ADDRESS: **905 WEST NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **RASSOUL & BAHMAN BEN DADGARI**
ADDRESS: **4968 S SPRING RUN DR**
SALT LAKE CITY, UT 84117

FACILITY DETAILS

PROJECT MANAGER: **MELISSA TURCHI**
NOTIFICATION DATE: **1/3/1995**
CLOSED DATE: **NOT REPORTED**

CAUSE AND RELEASE

CAUSE OF RELEASE: **NOT STATED**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **ENVIRONMENTAL ASSESSMENT**

Back to Report Summary

MAP ID# 13

Distance from Property: 0.177 mi. (935 ft.) NNW
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000251**
FACILITY ID: **3115**
FACILITY NAME: **SMITH'S GAS & VIDEO**
ADDRESS: **905 WEST NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **RASSOUL & BAHMAN BEN DADGARI**
ADDRESS: **4968 S SPRING RUN DR**
SALT LAKE CITY, UT 84117
OWNER PHONE: **(801) 685-9394**
TOTAL TANK: **6**
CLOSED TANK: **4**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **DIESEL**
TANK CAPACITY: **4000**
LAST USE: **12/1/1992**
DATE CLOSED: **1/21/1997**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/8/1971**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **NO**

TANK ID: **2**
ALTERNATIVE TANK ID: **2**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **6000**
LAST USE: **12/1/1992**
DATE CLOSED: **1/21/1997**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/8/1971**

IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **NO**

TANK ID: **3**
ALTERNATIVE TANK ID: **3**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **KEROSENE**
TANK CAPACITY: **8000**
LAST USE: **12/1/1992**
DATE CLOSED: **1/21/1997**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/8/1971**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **NO**

TANK ID: **4**
ALTERNATIVE TANK ID: **4**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **USED OIL**
TANK CAPACITY: **250**
LAST USE: **1/1/1974**
DATE CLOSED: **1/1/1974**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **1/1/1910**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**

TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **BARE STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **GRAVITY FEED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

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Leaking Underground Storage Tanks (LUST)

MAP ID# 14

Distance from Property: 0.194 mi. (1,024 ft.) ENE
Elevation: 4,228 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000179LUST**
FACILITY ID: **4000179**
FACILITY NAME: **CARTOW**
ADDRESS: **738 W SOUTH TEMPLE**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **CLEARWATER CARTAGE INC**
ADDRESS: **1800 S 300 W**
SALT LAKE CITY, UT 84115

FACILITY DETAILS

PROJECT MANAGER: **[DALE URBAN]**
NOTIFICATION DATE: **10/18/1993**
CLOSED DATE: **7/17/2002**

CAUSE AND RELEASE

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **USED OIL**
METHOD DETERMINED: **PERMANENT CLOSURE**
CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **NOT REPORTED**
METHOD DETERMINED: **4000 PPM O&G**

Back to Report Summary

MAP ID# 14

Distance from Property: 0.194 mi. (1,024 ft.) ENE
Elevation: 4,228 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000179**
FACILITY ID: **3044**
FACILITY NAME: **CARTOW**
ADDRESS: **738 W SOUTH TEMPLE**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **CLEARWATER CARTAGE INC**
ADDRESS: **1800 S 300 W**
SALT LAKE CITY, UT 84115
OWNER PHONE: **(801) 486-6161**
TOTAL TANK: **5**
CLOSED TANK: **5**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **4000**
LAST USE: **5/5/1983**
DATE CLOSED: **6/29/1994**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **4/17/1979**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **2**
ALTERNATIVE TANK ID: **2**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **DIESEL**
TANK CAPACITY: **8000**
LAST USE: **5/5/1983**
DATE CLOSED: **6/29/1994**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **4/17/1979**

IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **BARE STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **3**
ALTERNATIVE TANK ID: **3**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **NEW OIL**
TANK CAPACITY: **500**
LAST USE: **5/5/1983**
DATE CLOSED: **6/29/1994**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **4/17/1979**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **4**
ALTERNATIVE TANK ID: **4**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **USED OIL**
TANK CAPACITY: **500**
LAST USE: **5/5/1983**
DATE CLOSED: **6/29/1994**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **4/17/1979**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**

TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **5**
ALTERNATIVE TANK ID: **5**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **OTHER**
TANK CAPACITY: **500**
LAST USE: **5/5/1983**
DATE CLOSED: **6/29/1994**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **4/17/1979**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

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Leaking Underground Storage Tanks (LUST)

MAP ID# 15

Distance from Property: 0.196 mi. (1,035 ft.) NW
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001483LUST**
FACILITY ID: **4001483**
FACILITY NAME: **M. KENT FOOTE**
ADDRESS: **935 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **M KENT FOOTE**
ADDRESS: **2160 S STATE ST**
SALT LAKE CITY, UT 84115

FACILITY DETAILS

PROJECT MANAGER: **[ROBIN JENKINS]**
NOTIFICATION DATE: **8/11/1989**
CLOSED DATE: **3/27/1991**

CAUSE AND RELEASE

CAUSE OF RELEASE: **SPILL/OVERFILL**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **OTHER: SOIL VAPOR SURVEY**

CAUSE OF RELEASE: **SPILL/OVERFILL**
SUBSTANCE RELEASE: **USED OIL**
METHOD DETERMINED: **NOT REPORTED**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **NOT REPORTED**
METHOD DETERMINED: **REMOVAL, 8020/8015**

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MAP ID# 15

Distance from Property: 0.196 mi. (1,035 ft.) NW
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001483**
FACILITY ID: **4226**
FACILITY NAME: **M. KENT FOOTE**
ADDRESS: **935 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **M KENT FOOTE**
ADDRESS: **2160 S STATE ST**
SALT LAKE CITY, UT 84115
OWNER PHONE: **(801) 596-1000**
TOTAL TANK: **4**
CLOSED TANK: **4**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **5000**
LAST USE: **2/1/1983**
DATE CLOSED: **8/10/1989**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/30/1981**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **UNKNOWN**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **2**
ALTERNATIVE TANK ID: **2**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **4000**
LAST USE: **2/1/1983**
DATE CLOSED: **8/10/1989**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/31/1979**

IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **UNKNOWN**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **3**
ALTERNATIVE TANK ID: **3**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **4000**
LAST USE: **2/1/1983**
DATE CLOSED: **8/10/1989**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/31/1979**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **UNKNOWN**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **4**
ALTERNATIVE TANK ID: **4**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **USED OIL**
TANK CAPACITY: **500**
LAST USE: **2/1/1983**
DATE CLOSED: **8/10/1989**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/31/1979**
IN COMPLIANCE: **NO**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **UNKNOWN**
TANK MODSDE: **NONE**

TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **NOT LISTED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

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Brownfield Properties (BF)

MAP ID# 16

Distance from Property: 0.21 mi. (1,109 ft.) ESE
Elevation: 4,232 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **PRE8**
DERR ID: **PRE8**
FACILITY NAME: **SALT LAKE CITY GATEWAY PILOT PROJECT**
ADDRESS: **NORTH TEMPLE ON NORTH, 300 WEST ON EAST, I15 ON WEST, 900 SOUTH STREET ON SOUTH**
SALT LAKE CITY, UT 84111
COUNTY: **SALT LAKE**
SITE TYPE: **BROWNFIELDS PROJECT**
PROJECT MANAGER: **[BRENT EVERETT]**
CONTACT PHONE: **8015364171**
PROJECT DESCRIPTION: **NOT REPORTED**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 17

Distance from Property: 0.212 mi. (1,119 ft.) NE
Elevation: 4,229 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000304LUST**
FACILITY ID: **4000304**
FACILITY NAME: **FLYING J**
ADDRESS: **757 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **FLYING J INC**
ADDRESS: **333 W CENTER ST**
NORTH SALT LAKE, UT 84054

FACILITY DETAILS

PROJECT MANAGER: **[DALE URBAN]**
NOTIFICATION DATE: **7/26/1991**
CLOSED DATE: **5/5/1995**

CAUSE AND RELEASE

CAUSE OF RELEASE: **LINE LEAK IN PIPE JOINT**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **OTHER: VISUAL**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **DIESEL**
METHOD DETERMINED: **NOT INDICATED/UNKNOWN**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 17

Distance from Property: 0.212 mi. (1,119 ft.) NE
Elevation: 4,229 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000575LUST**
FACILITY ID: **4000575**
FACILITY NAME: **MINIT-LUBE #1020**
ADDRESS: **757 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **Q LUBE INC**
ADDRESS: **1385 W 2200 S**
SALT LAKE CITY, UT 84119

FACILITY DETAILS

PROJECT MANAGER: **[JIM MARTIN]**
NOTIFICATION DATE: **2/10/1994**
CLOSED DATE: **2/16/1994**

CAUSE AND RELEASE

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **USED OIL**
METHOD DETERMINED: **NOT REPORTED**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **OTHER:NEW OIL/LUBE OIL**
METHOD DETERMINED: **NOT REPORTED**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **NOT REPORTED**
METHOD DETERMINED: **ANALYTICAL**

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MAP ID# 17

Distance from Property: 0.212 mi. (1,119 ft.) NE
Elevation: 4,229 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000304**
FACILITY ID: **3164**
FACILITY NAME: **FLYING J**
ADDRESS: **757 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **FLYING J INC**
ADDRESS: **333 W CENTER ST**
NORTH SALT LAKE, UT 84054
OWNER PHONE: **(801) 296-7716**
TOTAL TANK: **4**
CLOSED TANK: **4**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **12000**
LAST USE: **4/1/1991**
DATE CLOSED: **12/20/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/2/1976**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **NO**

TANK ID: **2**
ALTERNATIVE TANK ID: **2**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **12000**
LAST USE: **4/1/1991**
DATE CLOSED: **12/20/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/2/1976**

IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **NO**

TANK ID: **3**
ALTERNATIVE TANK ID: **3**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **12000**
LAST USE: **4/1/1991**
DATE CLOSED: **12/20/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/2/1976**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **NO**

TANK ID: **4**
ALTERNATIVE TANK ID: **4**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **DIESEL**
TANK CAPACITY: **12000**
LAST USE: **4/1/1991**
DATE CLOSED: **12/20/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **5/2/1976**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**

TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **GALVANIZED STEEL**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **NO**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

Back to Report Summary

MAP ID# 17

Distance from Property: 0.212 mi. (1,119 ft.) NE
Elevation: 4,229 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000575**
FACILITY ID: **3416**
FACILITY NAME: **MINIT-LUBE #1020**
ADDRESS: **757 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **Q LUBE INC**
ADDRESS: **1385 W 2200 S**
SALT LAKE CITY, UT 84119
OWNER PHONE: **(801) 975-4699**
TOTAL TANK: **5**
CLOSED TANK: **5**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **W-1**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **USED OIL**
TANK CAPACITY: **3000**
LAST USE: **6/1/1993**
DATE CLOSED: **10/13/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **2/29/1976**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **GRAVITY FEED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **2**
ALTERNATIVE TANK ID: **W-2**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **USED OIL**
TANK CAPACITY: **3000**
LAST USE: **6/1/1993**
DATE CLOSED: **10/13/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **2/29/1976**

IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **GRAVITY FEED**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **3**
ALTERNATIVE TANK ID: **10-30**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **NEW OIL**
TANK CAPACITY: **3000**
LAST USE: **6/1/1993**
DATE CLOSED: **10/13/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **2/29/1976**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **U.S. SUCTION**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **4**
ALTERNATIVE TANK ID: **10-40**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **NEW OIL**
TANK CAPACITY: **3000**
LAST USE: **6/1/1993**
DATE CLOSED: **10/13/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **2/29/1976**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**

TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **U.S. SUCTION**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

TANK ID: **5**
ALTERNATIVE TANK ID: **30**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **NEW OIL**
TANK CAPACITY: **3000**
LAST USE: **6/1/1993**
DATE CLOSED: **10/13/1993**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **2/29/1976**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **ASPHALT COATED OR BARE STEEL**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **OTHER**
PIPE MATERIAL: **UNKNOWN**
PIPE MODDES: **NONE**
PIPE TYPE: **U.S. SUCTION**
PIPE RELEASE DETECTION: **OTHER**
PST FUND: **NO**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

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Alternative Fueling Stations (ALTFUELS)

MAP ID# 18

Distance from Property: 0.214 mi. (1,130 ft.) WSW
Elevation: 4,225 ft. (Lower than TP)

FACILITY INFORMATION

GEOSEARCH ID: **534**
UNIQUE IDENTIFIER FOR THIS SPECIFIC STATION: **534**
STATION NAME: **SALT LAKE OPERATIONS CENTER**
ADDRESS: **1078 W 100 S**
SALT LAKE CITY, UT 84104
INTERSECTION DIRECTIONS: **NOT REPORTED**
STATION PHONE: **NOT REPORTED**
STATION CURRENT STATUS: **OPEN: THE STATION IS OPEN.**
TYPE OF ALTERNATIVE FUEL THE STATION PROVIDES: **COMPRESSED NATURAL GAS**
OWNER TYPE: **UTILITY OWNED**
FEDERAL AGANCY ID: **NOT REPORTED**
FEDERAL AGENCY NAME: **NOT REPORTED**
DATE THAT THE STATION BEGAN OFFERING THE FUEL: **11/15/1996**
DATE THE STATION'S DETAILS WERE LAST CONFIRMED: **12/1/2016**
TIME THE STATION'S DETAILS WERE LAST UPDATED (ISO 8601 FORMAT).: **2017-01-18 01:29:01 UTC**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 19

Distance from Property: 0.215 mi. (1,135 ft.) ESE
Elevation: 4,236 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001593LUST**
FACILITY ID: **4001593**
FACILITY NAME: **CITY CAB CO.**
ADDRESS: **710 W 100 S**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **UTAH DEPARTMENT OF TRANSPORTATION**
ADDRESS: **480 N 2200 W BLDG B**
SALT LAKE CITY, UT 84119

FACILITY DETAILS

PROJECT MANAGER: **HONG LEI TAO**
NOTIFICATION DATE: **11/21/1997**
CLOSED DATE: **8/30/2007**

CAUSE AND RELEASE

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **TANK CLOSURE**

Back to Report Summary

MAP ID# 19

Distance from Property: 0.215 mi. (1,135 ft.) ESE
Elevation: 4,236 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001593**
FACILITY ID: **4330**
FACILITY NAME: **CITY CAB CO.**
ADDRESS: **710 W 100 S**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **UTAH DEPARTMENT OF TRANSPORTATION**
ADDRESS: **480 N 2200 W BLDG B**
SALT LAKE CITY, UT 84119
OWNER PHONE: **(801) 594-6297**
TOTAL TANK: **1**
CLOSED TANK: **1**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **PERMANENTLY OUT OF USE**
SUBSTANCE: **GASOLINE**
TANK CAPACITY: **10000**
LAST USE: **11/21/1997**
DATE CLOSED: **11/21/1997**
CLOSURE STATUS: **TANK REMOVED FROM GROUND**
DATE INSTALLED: **11/15/1988**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **NO**
TANK MATERIAL: **FIBERGLASS REINFORCED PLASTIC**
TANK MODSDE: **NONE**
TANK RELEASE DETECTION: **TTT/IC**
PIPE MATERIAL: **FIBERGLASS REINFORCED PLASTIC**
PIPE MODDES: **NONE**
PIPE TYPE: **PRESSURIZED**
PIPE RELEASE DETECTION: **LTT**
PST FUND: **YES**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

Back to Report Summary

MAP ID# 20

Distance from Property: 0.247 mi. (1,304 ft.) WSW
Elevation: 4,225 ft. (Lower than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4002142**
FACILITY ID: **4853**
FACILITY NAME: **VIA WEST**
ADDRESS: **118 S 1000 W**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **VIAWEST**
ADDRESS: **118 S 1000 W**
SALT LAKE CITY, UT 84104
OWNER PHONE: **(801) 617-2921**
TOTAL TANK: **1**
CLOSED TANK: **NOT REPORTED**

TANK INFORMATION

TANK ID: **1**
ALTERNATIVE TANK ID: **1**
STATUS: **CURRENTLY IN USE**
SUBSTANCE: **DIESEL**
TANK CAPACITY: **4000**
LAST USE: **NOT REPORTED**
DATE CLOSED: **NOT REPORTED**
CLOSURE STATUS: **NOT REPORTED**
DATE INSTALLED: **9/4/1996**
IN COMPLIANCE: **YES**
ABOVE TANK: **NO**
TANK EMERGE: **YES**
TANK MATERIAL: **FIBERGLASS REINFORCED PLASTIC**
TANK MODSDE: **DOUBLE-WALLED**
TANK RELEASE DETECTION: **DEFERRED**
PIPE MATERIAL: **FLEXIBLE PLASTIC**
PIPE MODDES: **DOUBLE-WALLED**
PIPE TYPE: **SAFE SUCTION**
PIPE RELEASE DETECTION: **DEFERRED**
PST FUND: **YES**

COMPLIANCE UST NO COMPLIANCE UST REPORTED

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Leaking Underground Storage Tanks (LUST)

MAP ID# 21

Distance from Property: 0.255 mi. (1,346 ft.) N
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000211LUST**
FACILITY ID: **4000211**
FACILITY NAME: **FRESH MARKET 2383**
ADDRESS: **140 NORTH 900 WEST**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **ASSOCIATED FRESH MARKETS, INC.**
ADDRESS: **1850 W 2100 S**
SALT LAKE CITY, UT 84119

FACILITY DETAILS

PROJECT MANAGER: **MIKE PECORELLI**
NOTIFICATION DATE: **5/31/2002**
CLOSED DATE: **8/30/2006**

PROJECT MANAGER: **[DALE URBAN]**
NOTIFICATION DATE: **9/18/1991**
CLOSED DATE: **3/17/1997**

CAUSE AND RELEASE

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **OTHER: SAMPLING**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 22

Distance from Property: 0.267 mi. (1,410 ft.) NW
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001026LUST**
FACILITY ID: **4001026**
FACILITY NAME: **7-ELEVEN 1851-24573**
ADDRESS: **960 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **7-ELEVEN INC**
ADDRESS: **PO BOX 711**
DALLAS, TX 75221

FACILITY DETAILS

PROJECT MANAGER: **LAURAN ORTMAN**
NOTIFICATION DATE: **10/14/2016**
CLOSED DATE: **3/21/2017**

PROJECT MANAGER: **LAURAN ORTMAN**
NOTIFICATION DATE: **10/14/2016**
CLOSED DATE: **NOT REPORTED**

PROJECT MANAGER: **MIKE PECORELLI**
NOTIFICATION DATE: **7/28/1999**
CLOSED DATE: **3/26/2012**

PROJECT MANAGER: **[SHELLY QUICK]**
NOTIFICATION DATE: **2/13/1989**
CLOSED DATE: **12/18/1990**

CAUSE RELEASE NO CAUSE AND RELEASE REPORTED

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MAP ID# 23

Distance from Property: 0.291 mi. (1,536 ft.) WNW
Elevation: 4,224 ft. (Lower than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001638LUST**
FACILITY ID: **4001638**
FACILITY NAME: **GRANITE MILL IND. COMPLEX**
ADDRESS: **1055 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **THE BOYER COMPANY**
ADDRESS: **101 SOUTH 200 EAST, SUITE 200**
SALT LAKE CITY, UT 84111

FACILITY DETAILS

PROJECT MANAGER: **[ROCKY STONESTREET]**
NOTIFICATION DATE: **11/26/1990**
CLOSED DATE: **6/19/1995**

CAUSE AND RELEASE

CAUSE OF RELEASE: **TANK FAILURE-CORROSION**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **PERMANENT CLOSURE**

CAUSE OF RELEASE: **TANK FAILURE-CORROSION**
SUBSTANCE RELEASE: **DIESEL**
METHOD DETERMINED: **PERMANENT CLOSURE**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **NOT REPORTED**
METHOD DETERMINED: **REMOVAL, 8015 MOD**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 24

Distance from Property: 0.298 mi. (1,573 ft.) NE
Elevation: 4,228 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000190LUST**
FACILITY ID: **4000190**
FACILITY NAME: **WONDER HOSTESS BAKERY THRIFT SHOP**
ADDRESS: **708 W NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **INTERSTATE BRANDS CORPORATION**
ADDRESS: **P O BOX 108**
OGDEN, UT 84402

FACILITY DETAILS

PROJECT MANAGER: **MELISSA TURCHI**
NOTIFICATION DATE: **7/11/2005**
CLOSED DATE: **6/19/2006**

CAUSE AND RELEASE

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **DIESEL**
METHOD DETERMINED: **ENVIRONMENTAL ASSESSMENT**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 25

Distance from Property: 0.299 mi. (1,579 ft.) SE
Elevation: 4,227 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000412LUST**
FACILITY ID: **4000412**
FACILITY NAME: **GENEVA ROCK PRODUCTS,INC.**
ADDRESS: **748 W 300 S**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **GENEVA ROCK PRODUCTS INC**
ADDRESS: **730 N 1500 W**
OREM, UT 84057

FACILITY DETAILS

PROJECT MANAGER: **[DEANN RASMUSSEN]**
NOTIFICATION DATE: **11/16/2001**
CLOSED DATE: **5/19/2003**

PROJECT MANAGER: **[EVAN SULLIVAN]**
NOTIFICATION DATE: **11/26/1990**
CLOSED DATE: **12/11/1997**

CAUSE AND RELEASE

CAUSE OF RELEASE: **PIPING FAILURE**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **FAILED LTT**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 26

Distance from Property: 0.314 mi. (1,658 ft.) SW
Elevation: 4,225 ft. (Lower than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4002113LUST**
FACILITY ID: **4002113**
FACILITY NAME: **OLD GAS STATION**
ADDRESS: **180 S 1000 W**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **SALT LAKE NEIGHBORHOOD HOUSING SERVICES**
ADDRESS: **622 W 500 N**
SALT LAKE CITY, UT 84116

FACILITY DETAILS

PROJECT MANAGER: **[DALE URBAN]**
NOTIFICATION DATE: **4/10/2001**
CLOSED DATE: **7/28/2003**

CAUSE AND RELEASE

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **ENVIRONMENTAL ASSESSMENT**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 27

Distance from Property: 0.339 mi. (1,790 ft.) W
Elevation: 4,224 ft. (Lower than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000627LUST**
FACILITY ID: **4000627**
FACILITY NAME: **S.L. NORTH SERVICE STATION**
ADDRESS: **1070 W 100 S**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **DOMINION ENERGY QUESTAR PIPELINE, L.L.C.**
ADDRESS: **P O BOX 45360**
SALT LAKE CITY, UT 84145

FACILITY DETAILS

PROJECT MANAGER: **[ROCKY STONESTREET]**
NOTIFICATION DATE: **12/3/1990**
CLOSED DATE: **4/18/1994**

CAUSE AND RELEASE

CAUSE OF RELEASE: **OTHER: LEAKY UNION**
SUBSTANCE RELEASE: **DIESEL**
METHOD DETERMINED: **FAILED TTT**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **FAILED TTT**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **NOT REPORTED**
METHOD DETERMINED: **NOT REPORTED**

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Leaking Underground Storage Tanks (LUST)

MAP ID# 28

Distance from Property: 0.365 mi. (1,927 ft.) SE
Elevation: 4,229 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001428LUST**
FACILITY ID: **4001428**
FACILITY NAME: **EIMCO PROCESS EQUIPMENT CO.**
ADDRESS: **669 W 200 S**
SALT LAKE CITY, UT 84140
COUNTY: **SALT LAKE**
OWNER NAME: **EIMCO PROCESS EQUIPMENT CO**
ADDRESS: **669 W 2ND S**
SALT LAKE CITY, UT 84140

FACILITY DETAILS

PROJECT MANAGER: **[SHELLY QUICK]**
NOTIFICATION DATE: **10/12/1990**
CLOSED DATE: **5/11/1995**

PROJECT MANAGER: **[SHELLY QUICK]**
NOTIFICATION DATE: **9/21/1989**
CLOSED DATE: **7/3/1995**

CAUSE AND RELEASE

CAUSE OF RELEASE: **TANK FAILURE-CORROSION**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **PERMANENT CLOSURE**
CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **NOT REPORTED**
METHOD DETERMINED: **REMOVAL, 8015 MOD**

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MAP ID# 29

Distance from Property: 0.381 mi. (2,012 ft.) E
Elevation: 4,243 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **UTD980667240**
DERR ID: **UTD980667240**
FACILITY NAME: **UTAH POWER AND LIGHT AMERICAN BARREL CO.**
ADDRESS: **600 W SOUTH TEMPLE**
SALT LAKE CITY, UT 84101
COUNTY: **SALT LAKE**
PROJECT MANAGER: **CHAD GILGEN**
CONTACT PHONE: **8015364237**
PROJECT DESCRIPTION: **UPDATE 01-08-09:SITE IS A SMALL SLIVER OF LAND JUST SOUTH OF THE NORTH TEMPLE OVERPASS, BETWEEN 500 AND 600 WEST. RAILROAD TRACKS SLICE THROUGH THE PROPERTY.SITE WAS INITIALLY DISCOVERED BY LOCAL GRADE SCHOOL CHILDREN AS AN ATTRACTIVE NUISANCE DUE TO THE THOUSANDS OF EMPTY AND PARTIALLY EMPTY BARRELS ON THE GROUND. AMERICAN BARREL WAS THE NAME OF THE COMPANY THAT STORED, RECYCLED, AND RECONDITIONED 55-GALLON DRUMS OR BARRELS. THE 7-ACRE SITE WAS STORING THOUSANDS OF BARRELS IN VARIOUS CONDITIONS IN ROW AND ROW OF DRUMS PILED SEVERAL BARRELS HIGH. ONCE AN INVESTIGATION BEGUN, IT WAS DISCOVERED THAT THE SITE HAD ALSO ONCE BEEN THE LOCATION OF AN EARLY MANUFACTURED GAS PLANT IN THE LATE 1800S AND EARLY 1900S. DURING THE RI/FS STAGE, CONTAMINATION SUCH AS TARRY WASTES AND PAHS WERE FOUND AT DEPTH. CONTAMINANTS FROM THE PARTIALLY EMPTY/FULL BARRELS CONSISTED OF A WIDE RANGE OF HAZARDOUS CHEMICALS SUCH AS MALATHION, SODIUM CHROMATE, TRICHLOROETHANE, VARIOUS DEGREASERS, AND SOLVENTS. THESE CONTAMINANTS WERE GENERALLY CONFINED TO THE UPPER FEW INCHES OF THE SURFACE SOIL LEAD WAS ALSO FOUND IN THE SURFACE SOILS, PROBABLY RELATED TO THE NEARBY RAILROADS USING LEAD-CONTAMINATED SOILS IN THE AREA.THE BARRELS WERE REMOVED AND THE SITE NPL LISTED. UTAH POWER AND LIGHT WAS THE MAIN PRP SINCE THEIR PARENT COMPANY HAD OPERATED THE MANUFACTURED GAS PLANT. UPON COMPLETION OF THE RI/FS, IT WAS DECIDED TO EXCAVATE THE CONTAMINATED SOILS AND DISPOSE OF THEM, AND TO ADDRESS THE CONTAMINATED GROUNDWATER VIA NATURAL ATTENTION AND SOIL VAPOR EXTRACTION (SVE). EXCAVATION CLEANUP OCCURRED IN 1995-96, AND THE SVE SYSTEM WAS INSTALLED AND BROUGHT ON-LINE AFTER THAT. RD/RA OCCURRED IN TWO PHASES.THE SITE IS NOW IN OPERATION AND MAINTENANCE (O&M) AND HAS ITS 5-YEAR REVIEWS.SITE HISTORY:DISCOVERY AND CERCLIS LISTING 01-01-81NPL LISTING 10-04-89PRELIMINARY ASSESSMENT 04-01-81 (EPA) AND 04-09-87 (STATE)PRP REMOVAL (BARRELS, DRUMS, ETC) 04-14-88 TO 08-10-88EPA REMOVAL ASSESSMENTS 1990, 19**
EMERGENCY RESPONSE BRANCH: **NO**
NATIONAL PRIORITY LIST: **YES**
PROPOSED FOR NPL: **NO**
ARCHIVED FOR CERCLIS: **NO**

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MAP ID# 29

Distance from Property: 0.381 mi. (2,012 ft.) E
Elevation: 4,243 ft. (Higher than TP)

FACILITY INFORMATION

EPA ID#: **UTD980667240**
SITE ID#: **0800680**
NAME: **UTAH POWER & LIGHT/AMERICAN BARREL CO.**
ADDRESS: **600 W SOUTH TEMPLE**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
NATIONAL PRIORITY LISTING: **F - CURRENTLY ON THE FINAL NPL**
FEDERAL FACILITY CLASSIFICATION: **NO - NOT A FEDERAL FACILITY**
NON-NPL STATUS: **NOT REPORTED -**
NON-NPL STATUS DATE: **NOT REPORTED**
PHYSICAL CLASSIFICATION OF SITE / INCIDENT: **OTHER**

FEDERAL REGISTER INFORMATION

DATE	VOLUME	PAGE #	ACTION	HRS SCORE
05/05/1989	**54**	**19526**	**PROPOSED TO THE FINAL NPL**	**37.93000**
10/04/1989	**54**	**41015**	**PROMULGATED TO THE FINAL NPL**	**37.93000**

SITE DESCRIPTION

HAZARDOUS MATERIAL STORED: EMPTY BARRELS THAT AT ONE TIME CONTAINED MALATHION, SODIUM CHROMATE, TRICHLOROETHANE, VARIOUS DEGREASERS & SOLVENTS. BEGAN OPERATION ON UNKNOWN DATE AS BARREL STORAGE, RECYCLING, RECONDITIONING FACILITY.

SITE HISTORY **- NO SITE HISTORY INFORMATION AVAILABLE -**

ACTIONS

TYPE: **PA - PRELIMINARY ASSESSMENT**
START DATE: **NR**
COMPLETION DATE: **04/01/1981**
ACTION TYPE DEFINITION:
COLLECTION OF DIVERSE EXISTING INFORMATION ABOUT THE SOURCE AND NATURE OF THE SITE HAZARD. IT IS EPA POLICY TO COMPLETE THE PRELIMINARY ASSESSMENT WITHIN ONE YEAR OF SITE DISCOVERY.

TYPE: **OM - OPERATIONS AND MAINTENANCE**
START DATE: **09/30/1996**
COMPLETION DATE: **NR**
ACTION TYPE DEFINITION:
SITE REQUIREMENTS ASSOCIATED WITH A REMEDY THAT MUST BE PERFORMED AFTER THE COMPLETION OF A REMEDIAL ACTION.

TYPE: **NS - NATIONAL PRIORITIES LIST RESPONSIBLE PARTY SEARCH**
START DATE: **10/23/1989**
COMPLETION DATE: **01/03/1991**
ACTION TYPE DEFINITION:
THE NATIONAL PRIORITY LIST (NPL) POTENTIALLY RESPONSIBLE PARTY (PRP) SEARCH IS USED TO IDENTIFY PRPS AT A FINAL NPL OR PROPOSED NPL SITE. ACTIONS TYPICALLY INCLUDE TITLE SEARCH, FINANCIAL ASSESSMENTS, AND REVIEW OF APPLICABLE RECORDS. THE NPL PRP SEARCH SHOULD BEGIN UPON COMPLETION OF THE SCREENING SITE INVESTIGATION AND SHOULD BE CONDUCTED CONCURRENT WITH THE NATIONAL PRIORITIES LISTING PROCESS.

TYPE: **NP - PROPOSAL TO NATIONAL PRIORITIES LIST**
START DATE: **NR**
COMPLETION DATE: **05/05/1989**
ACTION TYPE DEFINITION:
SITE PROPOSED FOR INCLUSION ON THE NATIONAL PRIORITY LIST BASED ON THE HAZARD RANKING SYSTEM (HRS) SCORE FOR THE SITE.

TYPE: **NJ - NOTICE LETTERS ISSUED**
START DATE: **NR**
COMPLETION DATE: **03/14/1990**
ACTION TYPE DEFINITION:
EPA ISSUES NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES INFORMING THEM OF THEIR POTENTIAL LIABILITY UNDER CERCLA AND INVITING THEM TO DISCUSS INVOLVEMENT AT THE SITE.

TYPE: **NJ - NOTICE LETTERS ISSUED**
START DATE: **NR**
COMPLETION DATE: **03/23/1990**
ACTION TYPE DEFINITION:
EPA ISSUES NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES INFORMING THEM OF THEIR POTENTIAL LIABILITY UNDER CERCLA AND INVITING THEM TO DISCUSS INVOLVEMENT AT THE SITE.

TYPE: **NJ - NOTICE LETTERS ISSUED**
START DATE: **NR**
COMPLETION DATE: **07/16/1993**
ACTION TYPE DEFINITION:
EPA ISSUES NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES INFORMING THEM OF THEIR POTENTIAL LIABILITY UNDER CERCLA AND INVITING THEM TO DISCUSS INVOLVEMENT AT THE SITE.

TYPE: **NJ - NOTICE LETTERS ISSUED**
START DATE: **NR**
COMPLETION DATE: **03/14/1990**
ACTION TYPE DEFINITION:
EPA ISSUES NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES INFORMING THEM OF THEIR POTENTIAL LIABILITY UNDER CERCLA AND INVITING THEM TO DISCUSS INVOLVEMENT AT THE SITE.

TYPE: **NJ - NOTICE LETTERS ISSUED**
START DATE: **NR**
COMPLETION DATE: **03/23/1990**
ACTION TYPE DEFINITION:
EPA ISSUES NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES INFORMING THEM OF THEIR POTENTIAL LIABILITY UNDER CERCLA AND INVITING THEM TO DISCUSS INVOLVEMENT AT THE SITE.

TYPE: **NF - FINAL LISTING ON NATIONAL PRIORITIES LIST**
START DATE: **NR**
COMPLETION DATE: **10/04/1989**

ACTION TYPE DEFINITION:
SITE MOVED FROM PROPOSED LIST TO FINAL NATIONAL PRIORITY LIST.

TYPE: **PA - PRELIMINARY ASSESSMENT**
START DATE: **NR**
COMPLETION DATE: **04/09/1987**
ACTION TYPE DEFINITION:
COLLECTION OF DIVERSE EXISTING INFORMATION ABOUT THE SOURCE AND NATURE OF THE SITE HAZARD. IT IS EPA POLICY TO COMPLETE THE PRELIMINARY ASSESSMENT WITHIN ONE YEAR OF SITE DISCOVERY.

TYPE: **MA - STATE SUPPORT AGENCY COOPERATIVE AGREEMENT**
START DATE: **05/17/1990**
COMPLETION DATE: **09/30/1999**
ACTION TYPE DEFINITION:
FEDERAL RENUMERATION OF STATE ADMINISTRATIVE COSTS OF PARTICIPATION IN SITE-SPECIFIC REMEDIAL PLANNING OR IMPLEMENTATION ACTIVITIES.

TYPE: **SG - SPECIAL NOTICE ISSUED**
START DATE: **NR**
COMPLETION DATE: **07/16/1993**
ACTION TYPE DEFINITION:
ISSUANCE UNDER CERCLA SECTION 122 OF A SPECIAL NOTICE LETTER TO POTENTIALLY RESPONSIBLE PARTIES (PRPS). THE ISSUANCE OF A SPECIAL NOTICE LETTER BY EPA TRIGGERS A NEGOTIATION MORATORIUM. SPECIAL NOTICE LETTERS CAN BE ISSUED FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY, REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS.

TYPE: **MA - STATE SUPPORT AGENCY COOPERATIVE AGREEMENT**
START DATE: **03/10/1992**
COMPLETION DATE: **09/30/1999**
ACTION TYPE DEFINITION:
FEDERAL RENUMERATION OF STATE ADMINISTRATIVE COSTS OF PARTICIPATION IN SITE-SPECIFIC REMEDIAL PLANNING OR IMPLEMENTATION ACTIVITIES.

TYPE: **PC - PREPARATION OF COST DOCUMENT PACKAGE**
START DATE: **10/21/1999**
COMPLETION DATE: **03/27/2000**
ACTION TYPE DEFINITION:
PACKAGE PREPARED IN SUPPORT OF COST RECOVERY ACTIONS CONTAINING SITE-SPECIFIC COST DOCUMENTATION INFORMATION FOR DIRECT EXPENDITURES (I.E., AGENCY PAYROLL AND TRAVEL, CONTRACTING COSTS) AND INDIRECT COSTS. DOCUMENTATION MAY BE CONDENSED PER RULE 1006 OF THE FEDERAL RULES OF EVIDENCE.

TYPE: **TS - TREATABILITY STUDY**
START DATE: **08/14/1992**
COMPLETION DATE: **05/18/1993**
ACTION TYPE DEFINITION:
THE FIELD EFFORTS TO SUPPORT THE EVALUATION OF ALTERNATIVES TO DETERMINE THEIR APPLICABILITY FOR THE

SITE.

TYPE: **QX - PROSPECTIVE PURCHASER AGREEMENT ASSESSMENT**
START DATE: **07/06/2007**
COMPLETION DATE: **06/12/2009**
ACTION TYPE DEFINITION:
EPA REVIEWS A FORMAL REQUEST FOR A PROSPECTIVE PURCHASER AGREEMENT (PPA), RESULTING IN A DECISION TO GRANT OR DENY THE REQUEST.

TYPE: **LO - LODGED BY DOJ**
START DATE: **NR**
COMPLETION DATE: **12/02/1994**
ACTION TYPE DEFINITION:
AN ENFORCEMENT INSTRUMENT (E.G. CONSENT DECREE) IS LODGED BY DOJ WITH THE COURT.

TYPE: **RO - RECORD OF DECISION**
START DATE: **NR**
COMPLETION DATE: **07/07/1993**
ACTION TYPE DEFINITION:
THE FINAL RECORD OF DECISION (ROD) IS SIGNED BY THE APPROPRIATE AGENCY INDICATING THAT THE AGENCY HAS CHOSEN THE REMEDY FOR SITE REMEDIATION. ROD SIGNATURE IS SIGNIFIED BY THE COMPLETE DATE.

TYPE: **RS - REMOVAL ASSESSMENT**
START DATE: **08/30/1990**
COMPLETION DATE: **08/30/1990**
ACTION TYPE DEFINITION:
COLLECTING SITE CHARACTERISTICS TO DETERMINE WHETHER OR NOT A REMOVAL MUST BE PERFORMED.

TYPE: **RS - REMOVAL ASSESSMENT**
START DATE: **01/01/1991**
COMPLETION DATE: **06/17/1991**
ACTION TYPE DEFINITION:
COLLECTING SITE CHARACTERISTICS TO DETERMINE WHETHER OR NOT A REMOVAL MUST BE PERFORMED.

TYPE: **SG - SPECIAL NOTICE ISSUED**
START DATE: **NR**
COMPLETION DATE: **04/19/1990**
ACTION TYPE DEFINITION:
ISSUANCE UNDER CERCLA SECTION 122 OF A SPECIAL NOTICE LETTER TO POTENTIALLY RESPONSIBLE PARTIES (PRPS). THE ISSUANCE OF A SPECIAL NOTICE LETTER BY EPA TRIGGERS A NEGOTIATION MORATORIUM. SPECIAL NOTICE LETTERS CAN BE ISSUED FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY, REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS.

TYPE: **SG - SPECIAL NOTICE ISSUED**
START DATE: **NR**
COMPLETION DATE: **04/19/1990**

ACTION TYPE DEFINITION:
ISSUANCE UNDER CERCLA SECTION 122 OF A SPECIAL NOTICE LETTER TO POTENTIALLY RESPONSIBLE PARTIES (PRPS). THE ISSUANCE OF A SPECIAL NOTICE LETTER BY EPA TRIGGERS A NEGOTIATION MORATORIUM. SPECIAL NOTICE LETTERS CAN BE ISSUED FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY, REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS.

TYPE: **SG - SPECIAL NOTICE ISSUED**
START DATE: **NR**
COMPLETION DATE: **07/16/1993**
ACTION TYPE DEFINITION:
ISSUANCE UNDER CERCLA SECTION 122 OF A SPECIAL NOTICE LETTER TO POTENTIALLY RESPONSIBLE PARTIES (PRPS). THE ISSUANCE OF A SPECIAL NOTICE LETTER BY EPA TRIGGERS A NEGOTIATION MORATORIUM. SPECIAL NOTICE LETTERS CAN BE ISSUED FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY, REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS.

TYPE: **SI - SITE INSPECTION**
START DATE: **NR**
COMPLETION DATE: **05/10/1982**
ACTION TYPE DEFINITION:
THE PROCESS OF COLLECTING SITE DATA AND SAMPLES TO CHARACTERIZE THE SEVERITY OF THE HAZARD FOR THE HAZARD RANKING SCORE AND/OR ENFORCEMENT SUPPORT.

TYPE: **SI - SITE INSPECTION**
START DATE: **NR**
COMPLETION DATE: **03/15/1988**
ACTION TYPE DEFINITION:
THE PROCESS OF COLLECTING SITE DATA AND SAMPLES TO CHARACTERIZE THE SEVERITY OF THE HAZARD FOR THE HAZARD RANKING SCORE AND/OR ENFORCEMENT SUPPORT.

TYPE: **SI - SITE INSPECTION**
START DATE: **NR**
COMPLETION DATE: **06/01/1988**
ACTION TYPE DEFINITION:
THE PROCESS OF COLLECTING SITE DATA AND SAMPLES TO CHARACTERIZE THE SEVERITY OF THE HAZARD FOR THE HAZARD RANKING SCORE AND/OR ENFORCEMENT SUPPORT.

TYPE: **BF - POTENTIALLY RESPONSIBLE PARTY REMEDIAL ACTION**
START DATE: **07/23/1994**
COMPLETION DATE: **09/30/1996**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMEDIAL ACTION (RA), INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF THE RESPONSIBLE PARTIES TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **RS - REMOVAL ASSESSMENT**
START DATE: **02/18/1993**
COMPLETION DATE: **09/02/1993**
ACTION TYPE DEFINITION:
COLLECTING SITE CHARACTERISTICS TO DETERMINE WHETHER OR NOT A REMOVAL MUST BE PERFORMED.

TYPE: **AS - AERIAL SURVEY**
START DATE: **08/05/1992**
COMPLETION DATE: **05/01/1993**
ACTION TYPE DEFINITION:
PROVIDE AERIAL PHOTOGRAPHY, MULTISPECTRAL SCANNER (MSS), FORWARD LOOKING INFRARED (FLIR), AND HISTORICAL AERIAL PHOTOGRAPHS WITH ANALYSES SUPPORT FOR REGIONAL OFFICES AND OERR REQUIREMENTS FOR PRE-REMEDIAL AND REMEDIAL ACTIONS. THE AERIAL SURVEY SUPPORT PROVIDES FOUR TYPES OF REMOTE SENSING PROJECTS: (1) EMERGENCY RESPONSE PROJECTS FOR RAPID ACQUISITION AND ASSESSMENT, (2) SINGLE DATE PROJECTS TO ACQUIRE CURRENT DATA, (3) INTENSIVE SITE ANALYSES TO ACQUIRE IMAGERY OVER A PERIOD OF TIME USINGHISTORICAL AERIAL PHOTOGRAPHS DATING BACK AS FAR AS 1920, (4) WASTE SITE INVENTORIES TO ESTABLISH BASELINE REFERENCE OVER LARGE AREAS. CERCLA HAZARDOUS WASTE SITES.

TYPE: **CD - CONSENT DECREE**
START DATE: **07/23/1994**
COMPLETION DATE: **04/26/1995**
ACTION TYPE DEFINITION:
JUDICIAL AGREEMENT BETWEEN THE FEDERAL GOVERNMENT AND THE POTENTIALLY RESPONSIBLE PARTIES (PRPS) FULLY OR PARTIALLY SETTLING A CLAIM UNDER CERCLA. THIS AGREEMENT MAY SETTLE LITIGATION OR MAY BE PRESENTED CONCURRENTLY WITH THE COMPLAINT (ACHIEVED THROUGH NEGOTIATIONS). THE AGREEMENT MAY BE FOR RESPONSE WORK, COST RECOVERY, OR BOTH.

TYPE: **AC - ADMINISTRATIVE ORDER ON CONSENT**
START DATE: **NR**
COMPLETION DATE: **07/08/1988**
ACTION TYPE DEFINITION:
A VOLUNTARY AND ENFORCEABLE AGREEMENT PURSUANT TO CERCLA, SIGNED BY EPA AND POTENTIALLY RESPONSIBLE PARTIES (PRPS), WHEREBY THE PRPS AGREE TO PERFORM AND/OR PAY FOR SOME OR ALL OF THE RESPONSE COSTS INVOLVED IN SITE CLEANUP. THE ORDER DESCRIBES THE PRP RESPONSE TO BE TAKEN AT A SITE, STIPULATED PENALTIES, INDEMNIFICATION, EFFECTIVE DATE, AND MAY BE SUBJECT TO PUBLIC COMMENT. IT CAN BE FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS), REMEDIAL DESIGN (RD), AND REMEDIAL ACTION (RA),PRE-SARA; BUT ONLY REMOVAL AND RI/FS, POST-SARA.

TYPE: **AC - ADMINISTRATIVE ORDER ON CONSENT**
START DATE: **NR**
COMPLETION DATE: **08/10/1990**
ACTION TYPE DEFINITION:
A VOLUNTARY AND ENFORCEABLE AGREEMENT PURSUANT TO CERCLA, SIGNED BY EPA AND POTENTIALLY RESPONSIBLE PARTIES (PRPS), WHEREBY THE PRPS AGREE TO PERFORM AND/OR PAY FOR SOME OR ALL OF THE RESPONSE COSTS INVOLVED IN SITE CLEANUP. THE ORDER DESCRIBES THE PRP RESPONSE TO BE TAKEN AT A SITE, STIPULATED PENALTIES, INDEMNIFICATION, EFFECTIVE DATE, AND MAY BE SUBJECT TO PUBLIC COMMENT. IT CAN BE FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS), REMEDIAL DESIGN (RD), AND REMEDIAL ACTION

(RA),PRE-SARA; BUT ONLY REMOVAL AND RI/FS, POST-SARA.

TYPE: **AC - ADMINISTRATIVE ORDER ON CONSENT**
START DATE: **NR**
COMPLETION DATE: **06/12/2009**
ACTION TYPE DEFINITION:
A VOLUNTARY AND ENFORCEABLE AGREEMENT PURSUANT TO CERCLA, SIGNED BY EPA AND POTENTIALLY RESPONSIBLE PARTIES (PRPS), WHEREBY THE PRPS AGREE TO PERFORM AND/OR PAY FOR SOME OR ALL OF THE RESPONSE COSTS INVOLVED IN SITE CLEANUP. THE ORDER DESCRIBES THE PRP RESPONSE TO BE TAKEN AT A SITE, STIPULATED PENALTIES, INDEMNIFICATION, EFFECTIVE DATE, AND MAY BE SUBJECT TO PUBLIC COMMENT. IT CAN BE FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS), REMEDIAL DESIGN (RD), AND REMEDIAL ACTION (RA),PRE-SARA; BUT ONLY REMOVAL AND RI/FS, POST-SARA.

TYPE: **AN - REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS**
START DATE: **07/16/1993**
COMPLETION DATE: **07/23/1994**
ACTION TYPE DEFINITION:
DISCUSSIONS AND INFORMATION EXCHANGE BETWEEN POTENTIALLY RESPONSIBLE PARTIES (PRPS) AND EPA (OR STATE) OVER THE LIABILITY OF THE PRP, WILLINGNESS, AND ABILITY TO CONDUCT THE REMEDIAL DESIGN AND/OR THE REMEDIAL ACTION AS IDENTIFIED IN THE RECORD OF DECISION (ROD).

TYPE: **JF - ECOLOGICAL RISK ASSESSMENT**
START DATE: **NR**
COMPLETION DATE: **05/08/1992**
ACTION TYPE DEFINITION:
ASSESSMENT OF THE BASELINE RISKS POSED BY THE SITE TO ECOLOGICAL RECEPTORS.

TYPE: **AR - ADMINISTRATIVE RECORDS**
START DATE: **01/02/1992**
COMPLETION DATE: **07/07/1993**
ACTION TYPE DEFINITION:
SARA SPECIFIES THAT ADMINISTRATIVE RECORDS BE COMPILED AT SUPERFUND SITES WHERE REMEDIAL OR REMOVAL RESPONSES ARE PLANNED, OR ARE OCCURRING, OR WHERE EPA IS ISSUING A UNILATERAL ORDER OR INITIATING LITIGATION TO TRACK ENFORCEMENT CASE BUDGET FUNDS USED FOR ANY RP LEAD ACTIVITY.

TYPE: **BB - POTENTIALLY RESPONSIBLE PARTY REMOVAL - TIME CRITICAL**
START DATE: **04/14/1988**
COMPLETION DATE: **08/10/1988**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMOVALS, INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF PRPS TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **BD - POTENTIALLY RESPONSIBLE PARTY REMEDIAL INVESTIGATION/FEASIBILITY STUDY**

START DATE: **08/10/1990**
COMPLETION DATE: **07/07/1993**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS), INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF THE RESPONSIBLE PARTIES TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **BE - POTENTIALLY RESPONSIBLE PARTY REMEDIAL DESIGN**
START DATE: **09/30/1993**
COMPLETION DATE: **04/25/1995**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMEDIAL DESIGN (RD), INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF THE RESPONSIBLE PARTIES TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **BE - POTENTIALLY RESPONSIBLE PARTY REMEDIAL DESIGN**
START DATE: **09/18/1995**
COMPLETION DATE: **04/01/1996**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMEDIAL DESIGN (RD), INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF THE RESPONSIBLE PARTIES TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **BF - POTENTIALLY RESPONSIBLE PARTY REMEDIAL ACTION**
START DATE: **09/18/1995**
COMPLETION DATE: **09/30/1996**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMEDIAL ACTION (RA), INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF THE RESPONSIBLE PARTIES TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **CM - PRELIMINARY CLOSE-OUT REPORT PREPARED**
START DATE: **NR**
COMPLETION DATE: **09/30/1996**
ACTION TYPE DEFINITION:
A REPORT PREPARED BY THE REMEDIAL PROGRAM MANAGER (RPM) VERIFYING THAT PHYSICAL CONSTRUCTION OF THE REMEDY IS COMPLETE, INDICATING MINOR PUNCH LIST ITEMS THAT REMAIN AND OUTLINING A SCHEDULE OF THE OUTSTANDING ACTIVITIES.

TYPE: **FN - REMEDIAL INVESTIGATION/FEASIBILITY STUDY NEGOTIATIONS**
START DATE: **04/19/1990**
COMPLETION DATE: **08/10/1990**
ACTION TYPE DEFINITION:
DISCUSSIONS BETWEEN EPA AND THE POTENTIALLY RESPONSIBLE PARTIES (PRPS) ON LIABILITY FOR AND CONDUCT OF A REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS).

TYPE: **CR - COMMUNITY INVOLVEMENT**
START DATE: **09/04/1990**
COMPLETION DATE: **07/30/1996**
ACTION TYPE DEFINITION:
THE COMMUNITY RELATIONS ACTIVITIES, I.E., PLAN, IMPLEMENTATION AND RESPONSIVENESS SUMMARY THAT MUST BE COMPLETED AT A SITE TO ADDRESS COMMUNITY CONCERNS.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NR**
COMPLETION DATE: **09/21/1989**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NR**
COMPLETION DATE: **02/27/1997**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NR**
COMPLETION DATE: **03/14/1990**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

TYPE: **AR - ADMINISTRATIVE RECORDS**
START DATE: **07/10/1988**
COMPLETION DATE: **07/10/1988**
ACTION TYPE DEFINITION:

SARA SPECIFIES THAT ADMINISTRATIVE RECORDS BE COMPILED AT SUPERFUND SITES WHERE REMEDIAL OR REMOVAL RESPONSES ARE PLANNED, OR ARE OCCURRING, OR WHERE EPA IS ISSUING A UNILATERAL ORDER OR INITIATING LITIGATION TO TRACK ENFORCEMENT CASE BUDGET FUNDS USED FOR ANY RP LEAD ACTIVITY.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NR**
COMPLETION DATE: **05/19/1993**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NR**
COMPLETION DATE: **06/28/1989**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

TYPE: **FE - FIVE-YEAR REVIEW**
START DATE: **12/01/2010**
COMPLETION DATE: **07/26/2011**
ACTION TYPE DEFINITION:
A REVIEW THAT IS CONDUCTED AT A MINIMUM OF EVERY FIVE YEARS TO DETERMINE IF THE IMPLEMENTATION AND PERFORMANCE OF A REMEDY IS PROTECTIVE OR WILL BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT.

TYPE: **FE - FIVE-YEAR REVIEW**
START DATE: **07/03/2006**
COMPLETION DATE: **09/27/2006**
ACTION TYPE DEFINITION:
A REVIEW THAT IS CONDUCTED AT A MINIMUM OF EVERY FIVE YEARS TO DETERMINE IF THE IMPLEMENTATION AND PERFORMANCE OF A REMEDY IS PROTECTIVE OR WILL BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT.

TYPE: **FE - FIVE-YEAR REVIEW**
START DATE: **06/01/2001**
COMPLETION DATE: **09/26/2001**
ACTION TYPE DEFINITION:
A REVIEW THAT IS CONDUCTED AT A MINIMUM OF EVERY FIVE YEARS TO DETERMINE IF THE IMPLEMENTATION AND PERFORMANCE OF A REMEDY IS PROTECTIVE OR WILL BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT.

TYPE: **ED - RISK/HEALTH ASSESSMENT**
START DATE: **NR**
COMPLETION DATE: **05/08/1992**

ACTION TYPE DEFINITION:
ASSESSMENT OF THE BASELINE RISKS POSED BY THE SITE TO HUMAN HEALTH.

TYPE: **DS - DISCOVERY**
START DATE: **NR**
COMPLETION DATE: **01/01/1981**
ACTION TYPE DEFINITION:
THE PROCESS BY WHICH A POTENTIAL HAZARDOUS WASTE SITE IS BROUGHT TO THE ATTENTION OF THE EPA. THE PROCESS CAN OCCUR THROUGH THE USE OF SEVERAL MECHANISMS SUCH AS A PHONE CALL OR REFERRAL BY ANOTHER GOVERNMENT AGENCY.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NR**
COMPLETION DATE: **03/23/1990**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

CONTAMINANTS
WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **2,4-DIMETHYLPHENOL**
CONTAMINANT GROUP NAME: **BASE NEUTRAL ACIDS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **2-METHYLPHENOL**
CONTAMINANT GROUP NAME: **BASE NEUTRAL ACIDS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **4-METHYLPHENOL**
CONTAMINANT GROUP NAME: **BASE NEUTRAL ACIDS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **PHENOL**
CONTAMINANT GROUP NAME: **BASE NEUTRAL ACIDS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**

CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **CYANIDE**
CONTAMINANT GROUP NAME: **INORGANICS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **ANTIMONY**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.069 MG/L**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **LEAD, INORGANIC**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **2-METHYLNAPHTHALENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **ACENAPHTHYLENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **ANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **FLUORENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **NAPHTHALENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **PHENANTHRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **1,2-DICHLOROETHANE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **25 MG/L**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **BENZENE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **1.4 MG/L**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **STYRENE (MONOMER)**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **TOLUENE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **XYLENE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **METALS**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**

HAZARDOUS SUBSTANCE NAME: **PAH**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **VOC**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **DIBENZOFURAN**
CONTAMINANT GROUP NAME: **DIOXINS/DIBENZOFURANS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **METALS**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **1,12-BENZOPERYLENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **ACENAPHTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **ANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **BIS(2-ETHYLHEXYL)PHTHALATE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**

CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **FLUORENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **INDENO(1,2,3-CD)PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **4,4-DDT**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **CAMPHECHLOR**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **CHLORDANE**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **4,4-DDE**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **4,4-DDT**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **CAMPHECHLOR**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **CHLORDANE**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **BENZENE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **O-XYLENE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **VOC**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **34 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **BASE NEUTRAL ACIDS**
CONTAMINANT GROUP NAME: **BASE NEUTRAL ACIDS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **5.61 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **LEAD, INORGANIC**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **1,2-BENZANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**

HAZARDOUS SUBSTANCE NAME: **11,12-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZO-PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **110 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **BENZO(B)FLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **BENZO[A]ANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **BENZO[A]PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **150 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **CHRYSENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIBENZO(A,H)ANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**

CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **77 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **INDENO(1,2,3-CD)PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **5.61 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **LEAD, INORGANIC**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **1,2-BENZANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **11,12-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZO-PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **110 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **150 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **CHRYSENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **77 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **INDENO(1,2,3-CD)PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **5.61 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **LEAD, INORGANIC**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **1,2-BENZANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **11,12-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**

HAZARDOUS SUBSTANCE NAME: **3,4-BENZO-PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **110 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **150 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **CHRYSENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **77 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **INDENO(1,2,3-CD)PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PESTICIDES**

LISTING OF PUBLISHED INSTITUTIONAL CONTROL SITE REPORT
REPORT TYPE: **ICS REQUIRED AND IMPLEMENTED**
URL LINK: **http://www.epa.gov/ictssw07/public/export/08/UTD980667240/UTD980667240_report.HTM**

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MAP ID# 29

Distance from Property: 0.381 mi. (2,012 ft.) E
Elevation: 4,243 ft. (Higher than TP)

FACILITY INFORMATION

UNIQUE ID: **UTD980667240NPL**
DERR ID: **UTD980667240**
FACILITY NAME: **UTAH POWER AND LIGHT AMERICAN BARREL CO.**
ADDRESS: **600 W SOUTH TEMPLE**
SALT LAKE CITY, UT 84101
COUNTY: **SALT LAKE**
SITE TYPE: **CERCLA**
PROJECT MANAGER: **CHAD GILGEN**
CONTACT PHONE: **8015364237**
PROJECT DESCRIPTION: **UPDATE 01-08-09:SITE IS A SMALL SLIVER OF LAND JUST SOUTH OF THE NORTH TEMPLE OVERPASS, BETWEEN 500 AND 600 WEST. RAILROAD TRACKS SLICE THROUGH THE PROPERTY.SITE WAS INITIALLY DISCOVERED BY LOCAL GRADE SCHOOL CHILDREN AS AN ATTRACTIVE NUISANCE DUE TO THE THOUSANDS OF EMPTY AND PARTIALLY EMPTY BARRELS ON THE GROUND. AMERICAN BARREL WAS THE NAME OF THE COMPANY THAT STORED, RECYCLED, AND RECONDITIONED 55-GALLON DRUMS OR BARRELS. THE 7-ACRE SITE WAS STORING THOUSANDS OF BARRELS IN VARIOUS CONDITIONS IN ROW AND ROW OF DRUMS PILED SEVERAL BARRELS HIGH. ONCE AN INVESTIGATION BEGUN, IT WAS DISCOVERED THAT THE SITE HAD ALSO ONCE BEEN THE LOCATION OF AN EARLY MANUFACTURED GAS PLANT IN THE LATE 1800S AND EARLY 1900S. DURING THE RI/FS STAGE, CONTAMINATION SUCH AS TARRY WASTES AND PAHS WERE FOUND AT DEPTH. CONTAMINANTS FROM THE PARTIALLY EMPTY/FULL BARRELS CONSISTED OF A WIDE RANGE OF HAZARDOUS CHEMICALS SUCH AS MALATHION, SODIUM CHROMATE, TRICHLOROETHANE, VARIOUS DEGREASERS, AND SOLVENTS. THESE CONTAMINANTS WERE GENERALLY CONFINED TO THE UPPER FEW INCHES OF THE SURFACE SOIL LEAD WAS ALSO FOUND IN THE SURFACE SOILS, PROBABLY RELATED TO THE NEARBY RAILROADS USING LEAD-CONTAMINATED SOILS IN THE AREA.THE BARRELS WERE REMOVED AND THE SITE NPL LISTED. UTAH POWER AND LIGHT WAS THE MAIN PRP SINCE THEIR PARENT COMPANY HAD OPERATED THE MANUFACTURED GAS PLANT. UPON COMPLETION OF THE RI/FS, IT WAS DECIDED TO EXCAVATE THE CONTAMINATED SOILS AND DISPOSE OF THEM, AND TO ADDRESS THE CONTAMINATED GROUNDWATER VIA NATURAL ATTENTION AND SOIL VAPOR EXTRACTION (SVE). EXCAVATION CLEANUP OCCURRED IN 1995-96, AND THE SVE SYSTEM WAS INSTALLED AND BROUGHT ON-LINE AFTER THAT. RD/RA OCCURRED IN TWO PHASES.THE SITE IS NOW IN OPERATION AND MAINTENANCE (O&M) AND HAS ITS 5-YEAR REVIEWS.SITE HISTORY:DISCOVERY AND CERCLIS LISTING 01-01-81NPL LISTING 10-04-89PRELIMINARY ASSESSMENT 04-01-81 (EPA) AND 04-09-87 (STATE)PRP REMOVAL (BARRELS, DRUMS, ETC) 04-14-88 TO 08-10-88EPA REMOVAL ASSESSMENTS 1990, 19**

Back to Report Summary

MAP ID# 29

Distance from Property: 0.381 mi. (2,012 ft.) E
Elevation: 4,243 ft. (Higher than TP)

EPA ID: **UTD980667240**
NAME: **UTAH POWER & LIGHT/AMERICAN BARREL CO.**
ADDRESS: **600 W SOUTH TEMPLE, SALT LAKE CITY, UT**
COUNTY: **SALT LAKE**
ROD DATE: **07/07/93**
ROD TYPE: **RECORD OF DECISION**
ROD ID: **08006801993ROD073**

UTAH POWER & LIGHT/AMERICAN BARREL CO.
ABSTRACT SITE NAME: UTAH POWER & LIGHT/AMERICAN BARREL CO.
ADDRESS: 600 W SOUTH TEMPLE
CITY & STATE: SALT LAKE CITY UT 84104
COUNTY: SALT LAKE

EPA ID: UTD980667240
EPA REGION: 08

NPL STATUS: CURRENTLY ON THE FINAL NPL

ROD TYPE: RECORD OF DECISION
ROD ID: EPA/ROD/R08-93/073
ROD DATE: 07/07/1993
OPERABLE UNIT(S): 01

MEDIA: SOIL, GW

CONTAMINANT: VOCS, OTHER ORGANICS, METALS

ABSTRACT:
THE 4-ACRE UTAH POWER & LIGHT/AMERICAN BARREL SITE IS AN INACTIVE COAL GASIFICATION AND CREOSOTE POLE TREATING PLANT LOCATED IN SALT LAKE CITY, UTAH. LAND USE IN THE AREA IS PREDOMINANTLY RESIDENTIAL, WITH LIGHT INDUSTRIAL. A SINGLE AQUIFER, CONSISTING OF THE SHALLOW, UNCONFINED AND THE DEEP, CONFINED ZONES, EXISTS BENEATH THE SITE. THE UNCONFINED ZONE IS NOT UTILIZED AS A DRINKING WATER SOURCE AT THE SITE; HOWEVER, THECONFINED ZONE IS UTILIZED AS A DRINKING WATER SUPPLY IN SOME AREAS OF THE VALLEY. THE SITE IS SITUATED IN THE JORDAN RIVER VALLEY, SURROUNDED BY MOUNTAINS, AND NEAR THE GREAT SALT LAKE. THE STUDY AREA FOR THIS SITE IS DIVIDED INTO GEOGRAPHIC AREAS CONSISTING OF THE AMERICAN BARREL YARD (ABY), THE DENVER AND RIO GRANDE WESTERN RAILROAD PROPERTY OR SOUTHEAST AREA (SEA), THE UNION PACIFIC RAILROAD PROPERTY OR NORTHWEST AREA (NWA), THE RESIDENTIAL AREA, AND THE INDUSTRIAL AREA OR DESERET PAINT SITE. FROM 1873 TO 1908, COAL GASIFICATION OPERATIONS OCCURRED ONSITE, WHICH INCLUDED COAL STORAGE SHEDS, A GAS-O-METER (GAS HOLDER), TAR WELLS, A COAL TAR STILL, THE GAS WORKS, AND THE PURIFYING HOUSE. THE GAS PLANT WAS LOCATED ON THE ABY, THE SEA, AND A PORTION OF THE NWA. THE GAS-O-METER WAS A BURIED TANK USED TO STORE GAS AFTER PRODUCTION AND BEFORE METERING OUT TO CUSTOMERS. IN THE EARLY 1900S, THIS STEP WAS ELIMINATED BY SWITCHING TO A SCRUBBER TECHNOLOGY. THE COAL GASIFICATION PROCEDURES PRODUCED BY-PRODUCTS HAVING COMMERCIAL VALUE, INCLUDING COKE, AMMONIA, TARS AND SLUDGE, TOLUENE, NAPHTHALENE, ANTHRACENE, AND PHENOLS. BY-PRODUCTS HAVING NO COMMERCIAL VALUE INCLUDED ASH, CLINKERS, HEAVY TARS,

SLUDGE, LIME SLUDGE, SPENT IRON OXIDES, LIQUID WASTES, AND STEAM CONDENSATES, WHICH WERE COMMONLY DISPOSED OF ONSITE IN PITS AND OFFSITE IN LANDFILLS. FROM 1909 TO 1929, THE SITE WAS UTILIZED AS A STORAGE YARD FOR EQUIPMENT, WOOD POWER POLES, AND OTHER ITEMS. FROM 1927 TO 1958, CREOSOTE POLE TREATING OPERATIONS OCCURRED, WHICH INCLUDED TWO POLE DIPPING TANKS:ONE UNDERGROUND, SEMI-OPEN TANK BUILT ON BURIED CONCRETE WALLS, AND ONE 400- GALLON CAPACITY STEAM HEATED TANK MADE OF WELDED OR RIVETED IRON WALLS THAT WAS USED IN CONJUCTION WITH A BOILER HOUSE AND HOT WELL TANK TO PRESSURE TREAT POLES IN HOT CREOSOTE BEFORE DRAINING INTO SIX INCHES OF SAND. THE SPECIFIC CHEMICAL COMPOSITION OF THE CREOSOTE USED ONSITE IS UNKNOWN.HOWEVER, TYPICAL CREOSOTE COMPOUNDS INCLUDE PAHS, PHENOLS, AND NITROGEN- SULFUR-, AND OXYGEN-HETEROCYCLIC COMPONENTS. FROM 1958 TO 1987, AMERICAN BARREL STORED UP TO 50,000 55-GALLON DRUMS AT ANY ONE TIME ON VIRTUALLY ALL PORTIONS OF THE ABY. IT IS ASSUMED THAT THE ENTIRE ABY WAS VULNERABLE TO LEAKS AND SPILLS OF THE DRUM CONTENTS. IN 1986, EPA CONDUCTED A SITE INVESTIGATION THAT REVEALED STAINED SOIL- AND PRODUCTCONTAINING DRUMS ONSITE. IN 1987, UTAH POWER & LIGHT (UP&L), THE PROPERTY OWNER, REQUIRED AMERICAN BARREL TO REMOVE ALL BARRELS AND DEBRIS FROM THE ABY AS TERMS FOR THEIR LEASE RENEWAL. DURING THE REMOVAL, BARREL CONTENTS CONTAINING PESTICIDES, SOLVENTS, RESINS, PAINTS AND PAINT REMOVERS, KEROSENE, GASOLINE, ETC. LEAKED AND SPILLED ONTO THE GROUND. IN 1987 AND 1988, EPA COLLECTED SOIL AND GROUND WATER SAMPLES WHICH INDICATED SOIL CONTAMINATION BY PAHS, PHENOLS, HEAVY METALS, PESTICIDES, NONAQUEOUS PHASE LIQUIDS (NAPLS), STYRENE, AND BTEX COMPOUNDS; AND GROUND WATER CONTAMINATION PRIMARILY CONSISTING OF LNAPLS, BTEX COMPOUNDS, AND STYRENE. EPA CONCLUDED THAT CONTAMINATION FROM HISTORICAL OPERATIONS AND CONTAMINANT SOURCES LEFT ONSITE AT THE TIME OF THE ABANDONMENT HAVE MIGRATED INTO THE SOIL AND GROUND WATER. IN 1988, EPA REQUIRED UP&L TO REPAIR PORTIONS OF THE EXISTING FENCE, INSTALL A NEW FENCE TO COMPLETELY SURROUND THE YARD, AND TO CUT DOWN TREES AND VEGETATION IN THE ABY. THIS ROD ADDRESSES A FINAL REMEDY FOR THE CONTAMINATED SOIL AND GROUND WATER IN THE ABY AND SEA. THE PRIMARY CONTAMINANTS OF CONCERN AFFECTING THE SOIL AND GROUND WATER ARE VOCS, INCLUDING BENZENE, TOLUENE, AND XYLENES; OTHER ORGANICS, INCLUDING PAHS, PCBS, PESTICIDES, AND PHENOLS; AND METALS, INCLUDING LEAD. SELECTED REMEDIAL ACTION: THE SELECTED REMEDIAL ACTION FOR THIS SITE INCLUDES EXCAVATING APPROXIMATELY 5,660 YD[3] OF PRINCIPAL THREAT SOIL IN THE TAR BERM AREA AND THE GAS-O-METER CONTENTS, TO THE EXTENT FEASIBLE AS DETERMINED BY EPA OR UNTIL THE CONCENTRATIONS OF EPA TARGET COMPOUND LIST PAHS ARE BELOW 9,000 MG/KG; CONDUCTING LEACHABILITY TESTS; SEGREGATING THE CONTAMINATED SOIL ONSITE INTO RCRA HAZARDOUS AND NON-HAZARDOUS WASTE, AND TEMPORARILY STORING THE WASTE ONSITE; EXCAVATING LOW-LEVEL THREAT SURFACE AND SUBSURFACE SOIL ON THE ABY AND SEA TO A DEPTH OF 10 FEET AND SEGREGATING THEM FROM PRINCIPAL THREAT RCRA HAZARDOUS WASTE ONSITE; RECYCLING APPROXIMATELY 13,850 YD[3] OF THE LOW-LEVEL THREAT SOIL OFFSITE INTO A COLD MIX ASPHALT PRODUCT USING SOLIDIFICATION; INCINERATING THE REMAINING RCRA HAZARDOUS SOIL OFFSITE IN A RCRA PERMITTED SUBTITLE C FACILITY; SEGREGATING APPROXIMATELY 4,620 YD[3] OF CALCAREOUS FILL MATERIAL UNCOVERED OR EXCAVATED DURING THE SOIL REMOVAL ACTION FROM OTHER CONTAMINATED SOIL, WITH DISPOSAL OF HAZARDOUS FILL MATERIAL OFFSITE IN A RCRA SUBTITLE C FACILITY AND NON-HAZARDOUS FILL OFFSITE IN A RCRA SUBTITLE D FACILITY; BACKFILLING THE EXCAVATED AREAS WITH CLEAN FILL AND REGRADING AND PLACING A SOIL COVER OVER THEM; INSTALLING AN IN-SITU SOIL VAPOR EXTRACTION (SVE) SYSTEM TO REMEDIATE APPROXIMATELY 570 YD[3] OF PRINCIPAL THREAT, LNAPL-CONTAMINATED SOIL IN THE ABY AND SEA USING GROUND WATER DEPRESSION AND VACUUM BLOWERS, WITH GAC TREATMENT OF RECOVERED VAPORS PRODUCED FROM THE SVE PRIOR TO DISCHARGING THEM TO THE ATMOSPHERE; EXTRACTING AND TREATING GROUND WATER ONSITE USING AIR STRIPPING AND/OR GAC; DISCHARGING THE TREATED GROUND WATER OFFSITE TO A POTW FOR FURTHER TREATMENT; ALLOWING THE REMAINING GROUND WATER CONTAMINANT PLUME TO NATURALLY ATTENUATE OVER 10 OR MORE YEARS; MONITORING THE GROUND WATER TO EVALUATE THE PROGRESS OF NATURAL ATTENUATION; AND IMPLEMENTING INSTITUTIONAL CONTROLS, INCLUDING DEED AND GROUND WATER USE RESTRICTIONS. THE ESTIMATED PRESENT WORTH COST FOR THIS REMEDIAL ACTION IS $10,583,000, WHICH INCLUDES AN ESTIMATED TOTAL O&M COST OF $2,836,000 FOR 30 YEARS. PERFORMANCE STANDARDS OR GOALS: CHEMICAL-SPECIFIC SOIL CLEANUP GOALS ARE

BASED ON HEALTH -BASED EXPOSURE LIMITS (ELS) AND FEDERAL AND STATE ARARS, AND INCLUDE BENZO(A)ANTHRACENE 47.7 MG/KG; BENZO(B)FLUORANTHENE 0.48 MG/KG; BENZO(K)FLUORANTHENE 47.7 MG/KG; BENZO(A)PYRENE 0.48 MG/KG; CHRYSENE 47.7MG/KG; DIBENZO(A,H)ANTHRACENE 0.48 MG/KG; DIELDRIN 0.36 MG/KG; INDENO(1,2,3- CD)PYRENE 47.7 MG/KG; AND LEAD 500 MG/KG. CHEMICALSPECIFIC GROUND WATER CLEANUP GOALS ARE BASED ON SDWA MCLS, THE NATIONALPRIMARY DRINKING WATER REGULATION ACTION LEVEL FOR LEAD, AND HEALTH-BASED ELS, AND INCLUDE ACENAPHTYLENE 2,190 UG/L; ANTIMONY 5 UG/L; BENZENE 5 UG/L; CYANIDE 200 UG/L;1,2-DCA 5 UG/L; 2,4-DIMETHYLPHENOL 730 UG/L; LEAD 15 UG/L; 2- METHYLNAPHTHALENE 1,460 UG/L; 2-METHYLPHENOL 1,830 UG/L; 4METHYLPHENOL 1,830 UG/L; NAPHTHALENE 1,460 UG/L; PHENOL 21,900 UG/L; STYRENE 100 UG/L; TOLUENE 1,000 UG/L; AND XYLENES 10,000 UG/L. INSTITUTIONAL CONTROLS: DEED AND GROUND WATER USE RESTRICTIONS WILL BE IMPLEMENTED TO DISCLOSE THE PRESENCE OF CONTAMINATED SOIL AND GROUND WATER ONSITE, FURTHER PROHIBIT THE DRILLING OF ANY WATER WELLS, AND PREVENT EXPOSURE TO THE GROUND WATER UNTIL REMEDIATION LEVELS ARE ACHIEVED.

REMEDY:
THE OBJECTIVE OF THIS RECORD OF DECISION (ROD) IS TO PROVIDE A REMEDY TO ADDRESS ALL CONTAMINATION CAUSED BY PREVIOUS SITE ACTIVITIES LOCATED ON THE AMERICAN BARREL YARD AND ADJACENT PROPERTIES WHICH AFFECT SURFACE SOILS, SUBSURFACE SOILS, AND GROUNDWATER. CONTAMINATION FROM HISTORICAL OPERATIONS AND CONTAMINANT SOURCES LEFT ON-SITE AT THE TIME OF ABANDONMENT HAVE MIGRATED INTO SOIL AND GROUNDWATER. REMEDIATION WILL BE TO THE EXTENT OF CONTAMINATION EMANATING FROM THE AMERICAN BARREL YARD AND DENVER RIO GRANDE AND WESTERN PROPERTIES.

THE RESPONSE ACTIONS DESCRIBED IN THIS ROD WILL PERMANENTLY ADDRESS ALL PRINCIPAL THREATS THROUGH TREATMENT. SOIL CONTAMINATION WILL BE REDUCED TO HEALTH BASED LEVELS FOR ALL CONTAMINANTS OF CONCERN. THESE LEVELS ARE BASED ON A FUTURE INDUSTRIAL USE OF THE SITE BUT WILL PROVIDE FOR FUTURE RESIDENTIAL DEVELOPMENT WITH ACCEPTABLE RISKS WITHIN EPA'S RISK RANGE OF 10[-4] TO 10[-6]. GROUNDWATER REMEDIATION LEVELS ARE BASED ON THE SAFE DRINKING WATER ACT MAXIMUM CONTAMINANT LEVELS OR ACCEPTABLE RISK LEVELS FOR FUTURE RESIDENTIAL EXPOSURE.

THE MAJOR COMPONENTS OF THE SELECTED REMEDY INCLUDE:
* EXCAVATION OF SOILS WHICH ARE PRINCIPAL THREATS BASED ON VISUAL OBSERVATION, TO THE EXTENT POSSIBLE GIVEN PHYSICAL LIMITATIONS RESULTING FROM LOCATIONS OF EXISTING RAILROAD LINES, OR UNTIL THE CONCENTRATIONS OF EPA TARGET COMPOUND LIST PAHS ARE BELOW 9,000 MG/KG. THE QUANTIFICATION OF PRINCIPAL THREATS IS BASED ON EPA GUIDANCE, "A GUIDE TO PRINCIPAL THREAT AND LOW LEVEL THREAT WASTES" WHICH SUGGESTS DEFINING PRINCIPAL THREATS AS HAVING A RISK OF 10[-3] OR GREATER.
* EXCAVATION OF SOILS EXCEEDING HEALTH BASED REMEDIATION LEVELS, BASED ON A 10[-6] WORKER EXPOSURE, THAT HAVE A POTENTIAL EXPOSURE PATHWAY. SOILS DOWN TO A DEPTH OF 10 FEET ARE CONSIDERED TO HAVE AN EXPOSURE PATHWAY.
* TREATMENT OF EXCAVATED SOILS THROUGH OFFSITE RECYCLING OF SOILS INTO A COLD MIX ASPHALT PRODUCT SUITABLE FOR PAVING ROADS. INCORPORATION OF CONTAMINATED SOILS AS A RAW MATERIAL INTO THE ASPHALT PRODUCT INVOLVES
TREATMENT THROUGH SOLIDIFICATION.
* IF ANY RCRA CHARACTERISTIC HAZARDOUS WASTES ARE ENCOUNTERED, THESE CONTAMINATED SOILS WILL BE SHIPPED OFFSITE FOR INCINERATION AND WILL NOT BE UTILIZED IN THE ASPHALT TREATMENT PROCESS.
* SOIL VAPOR EXTRACTION (SVE) WILL BE USED TO REMEDIATE PRINCIPAL THREAT LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL) CONTAMINATION. LOCATION OF THE SVE EXTRACTION WELLS WILL BE BASED ON A PRINCIPAL THREAT DEFINITION WHERE BENZENE IN SOILS EXCEEDS 10[-3] RISK LEVELS FOR RESIDENTIAL EXPOSURE TO GROUNDWATER. IN CONJUNCTION WITH SVE, GROUNDWATER WILL BE EXTRACTED FROM VAPOR EXTRACTION WELLS TO ENHANCE THE SVE

PROCESS. OFF-GAS FROM THE SVE SYSTEM WILL BE TREATED PRIOR TO DISCHARGE TO THE ATMOSPHERE.
*** GROUNDWATER EXTRACTED FROM SVE WELLS, WATER PUMPED FROM EXCAVATIONS, AND DECONTAMINATION WATER WILL BE TREATED TO POTW DISCHARGE STANDARDS AND THEN DISCHARGED TO THE SALT LAKE CITY POTW FOR FURTHER TREATMENT.**
*** THE DISSOLVED PHASE AQUEOUS GROUNDWATER CONTAMINATION PLUME IS EXPECTED TO NATURALLY ATTENUATE ONCE THE PRINCIPAL THREAT SOURCES FOR GROUNDWATER CONTAMINATION ARE REMEDIATED. IF MONITORING OF GROUNDWATER CONTAMINATION INDICATES THAT NATURAL ATTENUATION IS NOT RESTORING GROUNDWATER TO REMEDIATION LEVELS, ADDITIONAL OURCE REMOVAL OR MORE ACTIVE GROUNDWATER REMEDIATION MAY BE REQUIRED.**

Back to Report Summary

MAP ID# 29

Distance from Property: 0.467 mi. (2,466 ft.) E
Elevation: 4,243 ft. (Higher than TP)

FACILITY INFORMATION

EPA ID#: **UTD980667240**
SITE ID#: **0800680**
NAME: **UTAH POWER & LIGHT/AMERICAN BARREL CO.**
ADDRESS: **600 W SOUTH TEMPLE**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
FEDERAL FACILITY: **NO - NOT A FEDERAL FACILITY**
NPL: **CURRENTLY ON THE FINAL NPL**
NON NPL STATUS: **NOT REPORTED**

Below information was gathered from the prior CERCLIS update completed in 10/2013 update:
NON-NPL STATUS DATE: **NOT REPORTED**
PHYSICAL CLASSIFICATION OF SITE / INCIDENT: **OTHER**

FEDERAL REGISTER INFORMATION

DATE	VOLUME	PAGE #	ACTION	HRS SCORE
05/05/1989	**54**	**19526**	**PROPOSED TO THE FINAL NPL**	**37.93000**
10/04/1989	**54**	**41015**	**PROMULGATED TO THE FINAL NPL**	**37.93000**

SITE DESCRIPTION

HAZARDOUS MATERIAL STORED: EMPTY BARRELS THAT AT ONE TIME CONTAINED MALATHION, SODIUM CHROMATE, TRICHLOROETHANE, VARIOUS DEGREASERS & SOLVENTS. BEGAN OPERATION ON UNKNOWN DATE AS BARREL STORAGE, RECYCLING, RECONDITIONING FACILITY.

SITE HISTORY **- NO SITE HISTORY INFORMATION AVAILABLE -**

ACTIONS

TYPE: **PA - PRELIMINARY ASSESSMENT**
START DATE: **NOT REPORTED**
COMPLETION DATE: **04/01/1981**
ACTION TYPE DEFINITION:
COLLECTION OF DIVERSE EXISTING INFORMATION ABOUT THE SOURCE AND NATURE OF THE SITE HAZARD. IT IS EPA POLICY TO COMPLETE THE PRELIMINARY ASSESSMENT WITHIN ONE YEAR OF SITE DISCOVERY.

TYPE: **OM - OPERATIONS AND MAINTENANCE**
START DATE: **09/30/1996**
COMPLETION DATE: **NOT REPORTED**
ACTION TYPE DEFINITION:
SITE REQUIREMENTS ASSOCIATED WITH A REMEDY THAT MUST BE PERFORMED AFTER THE COMPLETION OF A REMEDIAL ACTION.

TYPE: **NS - NATIONAL PRIORITIES LIST RESPONSIBLE PARTY SEARCH**
START DATE: **10/23/1989**
COMPLETION DATE: **01/03/1991**
ACTION TYPE DEFINITION:
THE NATIONAL PRIORITY LIST (NPL) POTENTIALLY RESPONSIBLE PARTY (PRP) SEARCH IS USED TO IDENTIFY PRPS AT A FINAL NPL OR PROPOSED NPL SITE. ACTIONS TYPICALLY INCLUDE TITLE SEARCH, FINANCIAL ASSESSMENTS, AND

REVIEW OF APPLICABLE RECORDS. THE NPL PRP SEARCH SHOULD BEGIN UPON COMPLETION OF THE SCREENING SITE INVESTIGATION AND SHOULD BE CONDUCTED CONCURRENT WITH THE NATIONAL PRIORITIES LISTING PROCESS.

TYPE: **NP - PROPOSAL TO NATIONAL PRIORITIES LIST**
START DATE: **NOT REPORTED**
COMPLETION DATE: **05/05/1989**
ACTION TYPE DEFINITION:
SITE PROPOSED FOR INCLUSION ON THE NATIONAL PRIORITY LIST BASED ON THE HAZARD RANKING SYSTEM (HRS) SCORE FOR THE SITE.

TYPE: **NJ - NOTICE LETTERS ISSUED**
START DATE: **NOT REPORTED**
COMPLETION DATE: **03/14/1990**
ACTION TYPE DEFINITION:
EPA ISSUES NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES INFORMING THEM OF THEIR POTENTIAL LIABILITY UNDER CERCLA AND INVITING THEM TO DISCUSS INVOLVEMENT AT THE SITE.

TYPE: **NJ - NOTICE LETTERS ISSUED**
START DATE: **NOT REPORTED**
COMPLETION DATE: **03/23/1990**
ACTION TYPE DEFINITION:
EPA ISSUES NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES INFORMING THEM OF THEIR POTENTIAL LIABILITY UNDER CERCLA AND INVITING THEM TO DISCUSS INVOLVEMENT AT THE SITE.

TYPE: **NJ - NOTICE LETTERS ISSUED**
START DATE: **NOT REPORTED**
COMPLETION DATE: **07/16/1993**
ACTION TYPE DEFINITION:
EPA ISSUES NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES INFORMING THEM OF THEIR POTENTIAL LIABILITY UNDER CERCLA AND INVITING THEM TO DISCUSS INVOLVEMENT AT THE SITE.

TYPE: **NJ - NOTICE LETTERS ISSUED**
START DATE: **NOT REPORTED**
COMPLETION DATE: **03/14/1990**
ACTION TYPE DEFINITION:
EPA ISSUES NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES INFORMING THEM OF THEIR POTENTIAL LIABILITY UNDER CERCLA AND INVITING THEM TO DISCUSS INVOLVEMENT AT THE SITE.

TYPE: **NJ - NOTICE LETTERS ISSUED**
START DATE: **NOT REPORTED**
COMPLETION DATE: **03/23/1990**
ACTION TYPE DEFINITION:
EPA ISSUES NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES INFORMING THEM OF THEIR POTENTIAL LIABILITY UNDER CERCLA AND INVITING THEM TO DISCUSS INVOLVEMENT AT THE SITE.

TYPE: **NF - FINAL LISTING ON NATIONAL PRIORITIES LIST**

START DATE: **NOT REPORTED**
COMPLETION DATE: **10/04/1989**
ACTION TYPE DEFINITION:
SITE MOVED FROM PROPOSED LIST TO FINAL NATIONAL PRIORITY LIST.

TYPE: **PA - PRELIMINARY ASSESSMENT**
START DATE: **NOT REPORTED**
COMPLETION DATE: **04/09/1987**
ACTION TYPE DEFINITION:
COLLECTION OF DIVERSE EXISTING INFORMATION ABOUT THE SOURCE AND NATURE OF THE SITE HAZARD. IT IS EPA POLICY TO COMPLETE THE PRELIMINARY ASSESSMENT WITHIN ONE YEAR OF SITE DISCOVERY.

TYPE: **MA - STATE SUPPORT AGENCY COOPERATIVE AGREEMENT**
START DATE: **05/17/1990**
COMPLETION DATE: **09/30/1999**
ACTION TYPE DEFINITION:
FEDERAL RENUMERATION OF STATE ADMINISTRATIVE COSTS OF PARTICIPATION IN SITE-SPECIFIC REMEDIAL PLANNING OR IMPLEMENTATION ACTIVITIES.

TYPE: **SG - SPECIAL NOTICE ISSUED**
START DATE: **NOT REPORTED**
COMPLETION DATE: **07/16/1993**
ACTION TYPE DEFINITION:
ISSUANCE UNDER CERCLA SECTION 122 OF A SPECIAL NOTICE LETTER TO POTENTIALLY RESPONSIBLE PARTIES (PRPS). THE ISSUANCE OF A SPECIAL NOTICE LETTER BY EPA TRIGGERS A NEGOTIATION MORATORIUM. SPECIAL NOTICE LETTERS CAN BE ISSUED FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY, REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS.

TYPE: **MA - STATE SUPPORT AGENCY COOPERATIVE AGREEMENT**
START DATE: **03/10/1992**
COMPLETION DATE: **09/30/1999**
ACTION TYPE DEFINITION:
FEDERAL RENUMERATION OF STATE ADMINISTRATIVE COSTS OF PARTICIPATION IN SITE-SPECIFIC REMEDIAL PLANNING OR IMPLEMENTATION ACTIVITIES.

TYPE: **PC - PREPARATION OF COST DOCUMENT PACKAGE**
START DATE: **10/21/1999**
COMPLETION DATE: **03/27/2000**
ACTION TYPE DEFINITION:
PACKAGE PREPARED IN SUPPORT OF COST RECOVERY ACTIONS CONTAINING SITE-SPECIFIC COST DOCUMENTATION INFORMATION FOR DIRECT EXPENDITURES (I.E., AGENCY PAYROLL AND TRAVEL, CONTRACTING COSTS) AND INDIRECT COSTS. DOCUMENTATION MAY BE CONDENSED PER RULE 1006 OF THE FEDERAL RULES OF EVIDENCE.

TYPE: **TS - TREATABILITY STUDY**
START DATE: **08/14/1992**
COMPLETION DATE: **05/18/1993**

ACTION TYPE DEFINITION:
THE FIELD EFFORTS TO SUPPORT THE EVALUATION OF ALTERNATIVES TO DETERMINE THEIR APPLICABILITY FOR THE SITE.

TYPE: **QX - PROSPECTIVE PURCHASER AGREEMENT ASSESSMENT**
START DATE: **07/06/2007**
COMPLETION DATE: **06/12/2009**
ACTION TYPE DEFINITION:
EPA REVIEWS A FORMAL REQUEST FOR A PROSPECTIVE PURCHASER AGREEMENT (PPA), RESULTING IN A DECISION TO GRANT OR DENY THE REQUEST.

TYPE: **LO - LODGED BY DOJ**
START DATE: **NOT REPORTED**
COMPLETION DATE: **12/02/1994**
ACTION TYPE DEFINITION:
AN ENFORCEMENT INSTRUMENT (E.G. CONSENT DECREE) IS LODGED BY DOJ WITH THE COURT.

TYPE: **RO - RECORD OF DECISION**
START DATE: **NOT REPORTED**
COMPLETION DATE: **07/07/1993**
ACTION TYPE DEFINITION:
THE FINAL RECORD OF DECISION (ROD) IS SIGNED BY THE APPROPRIATE AGENCY INDICATING THAT THE AGENCY HAS CHOSEN THE REMEDY FOR SITE REMEDIATION. ROD SIGNATURE IS SIGNIFIED BY THE COMPLETE DATE.

TYPE: **RS - REMOVAL ASSESSMENT**
START DATE: **08/30/1990**
COMPLETION DATE: **08/30/1990**
ACTION TYPE DEFINITION:
COLLECTING SITE CHARACTERISTICS TO DETERMINE WHETHER OR NOT A REMOVAL MUST BE PERFORMED.

TYPE: **RS - REMOVAL ASSESSMENT**
START DATE: **01/01/1991**
COMPLETION DATE: **06/17/1991**
ACTION TYPE DEFINITION:
COLLECTING SITE CHARACTERISTICS TO DETERMINE WHETHER OR NOT A REMOVAL MUST BE PERFORMED.

TYPE: **SG - SPECIAL NOTICE ISSUED**
START DATE: **NOT REPORTED**
COMPLETION DATE: **04/19/1990**
ACTION TYPE DEFINITION:
ISSUANCE UNDER CERCLA SECTION 122 OF A SPECIAL NOTICE LETTER TO POTENTIALLY RESPONSIBLE PARTIES (PRPS). THE ISSUANCE OF A SPECIAL NOTICE LETTER BY EPA TRIGGERS A NEGOTIATION MORATORIUM. SPECIAL NOTICE LETTERS CAN BE ISSUED FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY, REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS.

TYPE: **SG - SPECIAL NOTICE ISSUED**

START DATE: **NOT REPORTED**
COMPLETION DATE: **04/19/1990**
ACTION TYPE DEFINITION:
ISSUANCE UNDER CERCLA SECTION 122 OF A SPECIAL NOTICE LETTER TO POTENTIALLY RESPONSIBLE PARTIES (PRPS). THE ISSUANCE OF A SPECIAL NOTICE LETTER BY EPA TRIGGERS A NEGOTIATION MORATORIUM. SPECIAL NOTICE LETTERS CAN BE ISSUED FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY, REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS.

TYPE: **SG - SPECIAL NOTICE ISSUED**
START DATE: **NOT REPORTED**
COMPLETION DATE: **07/16/1993**
ACTION TYPE DEFINITION:
ISSUANCE UNDER CERCLA SECTION 122 OF A SPECIAL NOTICE LETTER TO POTENTIALLY RESPONSIBLE PARTIES (PRPS). THE ISSUANCE OF A SPECIAL NOTICE LETTER BY EPA TRIGGERS A NEGOTIATION MORATORIUM. SPECIAL NOTICE LETTERS CAN BE ISSUED FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY, REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS.

TYPE: **SI - SITE INSPECTION**
START DATE: **NOT REPORTED**
COMPLETION DATE: **05/10/1982**
ACTION TYPE DEFINITION:
THE PROCESS OF COLLECTING SITE DATA AND SAMPLES TO CHARACTERIZE THE SEVERITY OF THE HAZARD FOR THE HAZARD RANKING SCORE AND/OR ENFORCEMENT SUPPORT.

TYPE: **SI - SITE INSPECTION**
START DATE: **NOT REPORTED**
COMPLETION DATE: **03/15/1988**
ACTION TYPE DEFINITION:
THE PROCESS OF COLLECTING SITE DATA AND SAMPLES TO CHARACTERIZE THE SEVERITY OF THE HAZARD FOR THE HAZARD RANKING SCORE AND/OR ENFORCEMENT SUPPORT.

TYPE: **SI - SITE INSPECTION**
START DATE: **NOT REPORTED**
COMPLETION DATE: **06/01/1988**
ACTION TYPE DEFINITION:
THE PROCESS OF COLLECTING SITE DATA AND SAMPLES TO CHARACTERIZE THE SEVERITY OF THE HAZARD FOR THE HAZARD RANKING SCORE AND/OR ENFORCEMENT SUPPORT.

TYPE: **BF - POTENTIALLY RESPONSIBLE PARTY REMEDIAL ACTION**
START DATE: **07/23/1994**
COMPLETION DATE: **09/30/1996**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMEDIAL ACTION (RA), INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF THE RESPONSIBLE PARTIES TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL

DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **RS - REMOVAL ASSESSMENT**
START DATE: **02/18/1993**
COMPLETION DATE: **09/02/1993**
ACTION TYPE DEFINITION:
COLLECTING SITE CHARACTERISTICS TO DETERMINE WHETHER OR NOT A REMOVAL MUST BE PERFORMED.

TYPE: **AS - AERIAL SURVEY**
START DATE: **08/05/1992**
COMPLETION DATE: **05/01/1993**
ACTION TYPE DEFINITION:
PROVIDE AERIAL PHOTOGRAPHY, MULTISPECTRAL SCANNER (MSS), FORWARD LOOKING INFRARED (FLIR), AND HISTORICAL AERIAL PHOTOGRAPHS WITH ANALYSES SUPPORT FOR REGIONAL OFFICES AND OERR REQUIREMENTS FOR PRE-REMEDIAL AND REMEDIAL ACTIONS. THE AERIAL SURVEY SUPPORT PROVIDES FOUR TYPES OF REMOTE SENSING PROJECTS: (1) EMERGENCY RESPONSE PROJECTS FOR RAPID ACQUISITION AND ASSESSMENT, (2) SINGLE DATE PROJECTS TO ACQUIRE CURRENT DATA, (3) INTENSIVE SITE ANALYSES TO ACQUIRE IMAGERY OVER A PERIOD OF TIME USINGHISTORICAL AERIAL PHOTOGRAPHS DATING BACK AS FAR AS 1920, (4) WASTE SITE INVENTORIES TO ESTABLISH BASELINE REFERENCE OVER LARGE AREAS. CERCLA HAZARDOUS WASTE SITES.

TYPE: **CD - CONSENT DECREE**
START DATE: **07/23/1994**
COMPLETION DATE: **04/26/1995**
ACTION TYPE DEFINITION:
JUDICIAL AGREEMENT BETWEEN THE FEDERAL GOVERNMENT AND THE POTENTIALLY RESPONSIBLE PARTIES (PRPS) FULLY OR PARTIALLY SETTLING A CLAIM UNDER CERCLA. THIS AGREEMENT MAY SETTLE LITIGATION OR MAY BE PRESENTED CONCURRENTLY WITH THE COMPLAINT (ACHIEVED THROUGH NEGOTIATIONS). THE AGREEMENT MAY BE FOR RESPONSE WORK, COST RECOVERY, OR BOTH.

TYPE: **AC - ADMINISTRATIVE ORDER ON CONSENT**
START DATE: **NOT REPORTED**
COMPLETION DATE: **07/08/1988**
ACTION TYPE DEFINITION:
A VOLUNTARY AND ENFORCEABLE AGREEMENT PURSUANT TO CERCLA, SIGNED BY EPA AND POTENTIALLY RESPONSIBLE PARTIES (PRPS), WHEREBY THE PRPS AGREE TO PERFORM AND/OR PAY FOR SOME OR ALL OF THE RESPONSE COSTS INVOLVED IN SITE CLEANUP. THE ORDER DESCRIBES THE PRP RESPONSE TO BE TAKEN AT A SITE, STIPULATED PENALTIES, INDEMNIFICATION, EFFECTIVE DATE, AND MAY BE SUBJECT TO PUBLIC COMMENT. IT CAN BE FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS), REMEDIAL DESIGN (RD), AND REMEDIAL ACTION (RA),PRE-SARA; BUT ONLY REMOVAL AND RI/FS, POST-SARA.

TYPE: **AC - ADMINISTRATIVE ORDER ON CONSENT**
START DATE: **NOT REPORTED**
COMPLETION DATE: **08/10/1990**
ACTION TYPE DEFINITION:
A VOLUNTARY AND ENFORCEABLE AGREEMENT PURSUANT TO CERCLA, SIGNED BY EPA AND POTENTIALLY RESPONSIBLE PARTIES (PRPS), WHEREBY THE PRPS AGREE TO PERFORM AND/OR PAY FOR SOME OR ALL OF THE

RESPONSE COSTS INVOLVED IN SITE CLEANUP. THE ORDER DESCRIBES THE PRP RESPONSE TO BE TAKEN AT A SITE, STIPULATED PENALTIES, INDEMNIFICATION, EFFECTIVE DATE, AND MAY BE SUBJECT TO PUBLIC COMMENT. IT CAN BE FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS), REMEDIAL DESIGN (RD), AND REMEDIAL ACTION (RA),PRE-SARA; BUT ONLY REMOVAL AND RI/FS, POST-SARA.

TYPE: **AC - ADMINISTRATIVE ORDER ON CONSENT**
START DATE: **NOT REPORTED**
COMPLETION DATE: **06/12/2009**
ACTION TYPE DEFINITION:
A VOLUNTARY AND ENFORCEABLE AGREEMENT PURSUANT TO CERCLA, SIGNED BY EPA AND POTENTIALLY RESPONSIBLE PARTIES (PRPS), WHEREBY THE PRPS AGREE TO PERFORM AND/OR PAY FOR SOME OR ALL OF THE RESPONSE COSTS INVOLVED IN SITE CLEANUP. THE ORDER DESCRIBES THE PRP RESPONSE TO BE TAKEN AT A SITE, STIPULATED PENALTIES, INDEMNIFICATION, EFFECTIVE DATE, AND MAY BE SUBJECT TO PUBLIC COMMENT. IT CAN BE FOR REMOVAL, REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS), REMEDIAL DESIGN (RD), AND REMEDIAL ACTION (RA),PRE-SARA; BUT ONLY REMOVAL AND RI/FS, POST-SARA.

TYPE: **AN - REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS**
START DATE: **07/16/1993**
COMPLETION DATE: **07/23/1994**
ACTION TYPE DEFINITION:
DISCUSSIONS AND INFORMATION EXCHANGE BETWEEN POTENTIALLY RESPONSIBLE PARTIES (PRPS) AND EPA (OR STATE) OVER THE LIABILITY OF THE PRP, WILLINGNESS, AND ABILITY TO CONDUCT THE REMEDIAL DESIGN AND/OR THE REMEDIAL ACTION AS IDENTIFIED IN THE RECORD OF DECISION (ROD).

TYPE: **JF - ECOLOGICAL RISK ASSESSMENT**
START DATE: **NOT REPORTED**
COMPLETION DATE: **05/08/1992**
ACTION TYPE DEFINITION:
ASSESSMENT OF THE BASELINE RISKS POSED BY THE SITE TO ECOLOGICAL RECEPTORS.

TYPE: **AR - ADMINISTRATIVE RECORDS**
START DATE: **01/02/1992**
COMPLETION DATE: **07/07/1993**
ACTION TYPE DEFINITION:
SARA SPECIFIES THAT ADMINISTRATIVE RECORDS BE COMPILED AT SUPERFUND SITES WHERE REMEDIAL OR REMOVAL RESPONSES ARE PLANNED, OR ARE OCCURRING, OR WHERE EPA IS ISSUING A UNILATERAL ORDER OR INITIATING LITIGATION TO TRACK ENFORCEMENT CASE BUDGET FUNDS USED FOR ANY RP LEAD ACTIVITY.

TYPE: **BB - POTENTIALLY RESPONSIBLE PARTY REMOVAL - TIME CRITICAL**
START DATE: **04/14/1988**
COMPLETION DATE: **08/10/1988**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMOVALS, INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF PRPS TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE

SCHEDULES.

TYPE: **BD - POTENTIALLY RESPONSIBLE PARTY REMEDIAL INVESTIGATION/FEASIBILITY STUDY**
START DATE: **08/10/1990**
COMPLETION DATE: **07/07/1993**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS), INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF THE RESPONSIBLE PARTIES TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **BE - POTENTIALLY RESPONSIBLE PARTY REMEDIAL DESIGN**
START DATE: **09/30/1993**
COMPLETION DATE: **04/25/1995**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMEDIAL DESIGN (RD), INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF THE RESPONSIBLE PARTIES TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **BE - POTENTIALLY RESPONSIBLE PARTY REMEDIAL DESIGN**
START DATE: **09/18/1995**
COMPLETION DATE: **04/01/1996**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMEDIAL DESIGN (RD), INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF THE RESPONSIBLE PARTIES TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **BF - POTENTIALLY RESPONSIBLE PARTY REMEDIAL ACTION**
START DATE: **09/18/1995**
COMPLETION DATE: **09/30/1996**
ACTION TYPE DEFINITION:
PROVIDES FOR OVERSIGHT OF POTENTIALLY RESPONSIBLE PARTY (PRP) RESPONSE ACTION FOR REMEDIAL ACTION (RA), INCLUDING ALL ACTIVITIES FOR MONITORING AND SUPERVISING THE PERFORMANCE OF THE RESPONSIBLE PARTIES TO DETERMINE WHETHER SUCH PERFORMANCE IS CONSISTENT WITH THE REQUIREMENTS OF THE ADMINISTRATIVE ORDERS ON CONSENT, UNILATERAL ADMINISTRATIVE ORDERS, CONSENT DECREES, JUDICIAL DECREES, INFORMATION AGREEMENTS, AND COMPLIANCE SCHEDULES.

TYPE: **CM - PRELIMINARY CLOSE-OUT REPORT PREPARED**
START DATE: **NOT REPORTED**
COMPLETION DATE: **09/30/1996**
ACTION TYPE DEFINITION:

A REPORT PREPARED BY THE REMEDIAL PROGRAM MANAGER (RPM) VERIFYING THAT PHYSICAL CONSTRUCTION OF THE REMEDY IS COMPLETE, INDICATING MINOR PUNCH LIST ITEMS THAT REMAIN AND OUTLINING A SCHEDULE OF THE OUTSTANDING ACTIVITIES.

TYPE: **FN - REMEDIAL INVESTIGATION/FEASIBILITY STUDY NEGOTIATIONS**
START DATE: **04/19/1990**
COMPLETION DATE: **08/10/1990**
ACTION TYPE DEFINITION:
DISCUSSIONS BETWEEN EPA AND THE POTENTIALLY RESPONSIBLE PARTIES (PRPS) ON LIABILITY FOR AND CONDUCT OF A REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS).

TYPE: **CR - COMMUNITY INVOLVEMENT**
START DATE: **09/04/1990**
COMPLETION DATE: **07/30/1996**
ACTION TYPE DEFINITION:
THE COMMUNITY RELATIONS ACTIVITIES, I.E., PLAN, IMPLEMENTATION AND RESPONSIVENESS SUMMARY THAT MUST BE COMPLETED AT A SITE TO ADDRESS COMMUNITY CONCERNS.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NOT REPORTED**
COMPLETION DATE: **09/21/1989**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NOT REPORTED**
COMPLETION DATE: **02/27/1997**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NOT REPORTED**
COMPLETION DATE: **03/14/1990**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

TYPE: **AR - ADMINISTRATIVE RECORDS**

START DATE: **07/10/1988**
COMPLETION DATE: **07/10/1988**
ACTION TYPE DEFINITION:
SARA SPECIFIES THAT ADMINISTRATIVE RECORDS BE COMPILED AT SUPERFUND SITES WHERE REMEDIAL OR REMOVAL RESPONSES ARE PLANNED, OR ARE OCCURRING, OR WHERE EPA IS ISSUING A UNILATERAL ORDER OR INITIATING LITIGATION TO TRACK ENFORCEMENT CASE BUDGET FUNDS USED FOR ANY RP LEAD ACTIVITY.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NOT REPORTED**
COMPLETION DATE: **05/19/1993**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NOT REPORTED**
COMPLETION DATE: **06/28/1989**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

TYPE: **FE - FIVE-YEAR REVIEW**
START DATE: **12/01/2010**
COMPLETION DATE: **07/26/2011**
ACTION TYPE DEFINITION:
A REVIEW THAT IS CONDUCTED AT A MINIMUM OF EVERY FIVE YEARS TO DETERMINE IF THE IMPLEMENTATION AND PERFORMANCE OF A REMEDY IS PROTECTIVE OR WILL BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT.

TYPE: **FE - FIVE-YEAR REVIEW**
START DATE: **07/03/2006**
COMPLETION DATE: **09/27/2006**
ACTION TYPE DEFINITION:
A REVIEW THAT IS CONDUCTED AT A MINIMUM OF EVERY FIVE YEARS TO DETERMINE IF THE IMPLEMENTATION AND PERFORMANCE OF A REMEDY IS PROTECTIVE OR WILL BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT.

TYPE: **FE - FIVE-YEAR REVIEW**
START DATE: **06/01/2001**
COMPLETION DATE: **09/26/2001**
ACTION TYPE DEFINITION:
A REVIEW THAT IS CONDUCTED AT A MINIMUM OF EVERY FIVE YEARS TO DETERMINE IF THE IMPLEMENTATION AND PERFORMANCE OF A REMEDY IS PROTECTIVE OR WILL BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT.

TYPE: **ED - RISK/HEALTH ASSESSMENT**
START DATE: **NOT REPORTED**
COMPLETION DATE: **05/08/1992**
ACTION TYPE DEFINITION:
ASSESSMENT OF THE BASELINE RISKS POSED BY THE SITE TO HUMAN HEALTH.

TYPE: **DS - DISCOVERY**
START DATE: **NOT REPORTED**
COMPLETION DATE: **01/01/1981**
ACTION TYPE DEFINITION:
THE PROCESS BY WHICH A POTENTIAL HAZARDOUS WASTE SITE IS BROUGHT TO THE ATTENTION OF THE EPA. THE PROCESS CAN OCCUR THROUGH THE USE OF SEVERAL MECHANISMS SUCH AS A PHONE CALL OR REFERRAL BY ANOTHER GOVERNMENT AGENCY.

TYPE: **IC - ISSUE REQUEST LETTERS (104E)**
START DATE: **NOT REPORTED**
COMPLETION DATE: **03/23/1990**
ACTION TYPE DEFINITION:
EPA ISSUES LETTERS UNDER THE AUTHORITY OF SECTION 104(E) TO GATHER INFORMATION RELATED TO (1) THE IDENTIFICATION, NATURE, AND QUANTITY OF MATERIALS; (2) THE NATURE OR EXTENT OF A RELEASE OR THREATENED RELEASE OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT; OR (3) THE ABILITY OF A PERSON TO PAY FOR OR TO PERFORM A CLEANUP.

CONTAMINANTS

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **2,4-DIMETHYLPHENOL**
CONTAMINANT GROUP NAME: **BASE NEUTRAL ACIDS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **2-METHYLPHENOL**
CONTAMINANT GROUP NAME: **BASE NEUTRAL ACIDS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **4-METHYLPHENOL**
CONTAMINANT GROUP NAME: **BASE NEUTRAL ACIDS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **PHENOL**

CONTAMINANT GROUP NAME: **BASE NEUTRAL ACIDS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **CYANIDE**
CONTAMINANT GROUP NAME: **INORGANICS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **ANTIMONY**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.069 MG/L**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **LEAD, INORGANIC**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **2-METHYLNAPHTHALENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **ACENAPHTHYLENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **ANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **FLUORENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**

CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **NAPHTHALENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **PHENANTHRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **1,2-DICHLOROETHANE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **25 MG/L**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **BENZENE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **1.4 MG/L**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **STYRENE (MONOMER)**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **TOLUENE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **GROUNDWATER 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **XYLENE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **METALS**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **PAH**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **VOC**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **DIBENZOFURAN**
CONTAMINANT GROUP NAME: **DIOXINS/DIBENZOFURANS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **METALS**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **1,12-BENZOPERYLENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **ACENAPHTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **ANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **BIS(2-ETHYLHEXYL)PHTHALATE**

CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **FLUORENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **INDENO(1,2,3-CD)PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **4,4-DDT**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **CAMPHECHLOR**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **CHLORDANE**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **4,4-DDE**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **4,4-DDT**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**

CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **CAMPHECHLOR**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **CHLORDANE**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **BENZENE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **O-XYLENE**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 01 MATRL**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **VOC**
CONTAMINANT GROUP NAME: **VOC**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **34 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **BASE NEUTRAL ACIDS**
CONTAMINANT GROUP NAME: **BASE NEUTRAL ACIDS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **5.61 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **LEAD, INORGANIC**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **1,2-BENZANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **11,12-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZO-PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **110 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **NOT REPORTED**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **BENZO(B)FLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **BENZO[A]ANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **BENZO[A]PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **150 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **CHRYSENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIBENZO(A,H)ANTHRACENE**

CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **77 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **INDENO(1,2,3-CD)PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 1**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **5.61 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **LEAD, INORGANIC**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **1,2-BENZANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **11,12-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZO-PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **110 MG/KG**

CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **150 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **CHRYSENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **77 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **INDENO(1,2,3-CD)PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 2**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PESTICIDES**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **5.61 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **LEAD, INORGANIC**
CONTAMINANT GROUP NAME: **METALS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **NOT REPORTED**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **1,2-BENZANTHRACENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **11,12-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **130 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZO-PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **110 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **3,4-BENZOFLUORANTHENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **150 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **CHRYSENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **77 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **INDENO(1,2,3-CD)PYRENE**
CONTAMINANT GROUP NAME: **PAH**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PERSISTANT ORGANIC POLLUTANTS**

WASTE SOURCE MEDIA CONTAMINATED NAME: **SOIL 3**
CONSTITUTENT CONTAMINANT MAXIMUM CONCENTRATION VALUE: **0.98 MG/KG**
CONSTITUTENT CONTAMINANT OF CONCERN FLAG: **YES**
HAZARDOUS SUBSTANCE NAME: **DIELDRIN**
CONTAMINANT GROUP NAME: **PESTICIDES**

LISTING OF PUBLISHED INSTITUTIONAL CONTROL SITE REPORT
REPORT TYPE: **ICS REQUIRED AND IMPLEMENTED**
URL LINK: **http://www.epa.gov/ictssw07/public/export/08/UTD980667240/UTD980667240_report.HTM**

Back to Report Summary

Leaking Underground Storage Tanks (LUST)

MAP ID# 30

Distance from Property: 0.386 mi. (2,038 ft.) ENE
Elevation: 4,234 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4002453LUST**
FACILITY ID: **4002453**
FACILITY NAME: **AIRPORT TRAX 650 WEST**
ADDRESS: **650 W NORTH TEMPLE**
SALT LAKE CITY, UT 84101
COUNTY: **SALT LAKE**
OWNER NAME: **UTAH TRANSIT AUTHORITY**
ADDRESS: **PO BOX 30810**
SALT LAKE CITY, UT 84130

FACILITY DETAILS

PROJECT MANAGER: **UST**
NOTIFICATION DATE: **2/24/2011**
CLOSED DATE: **3/14/2011**

CAUSE AND RELEASE

CAUSE OF RELEASE: **OVERFILL**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **PERMANENT CLOSURE SAMPLES**

Back to Report Summary

Leaking Underground Storage Tanks (LUST)

MAP ID# 31

Distance from Property: 0.392 mi. (2,070 ft.) ESE
Elevation: 4,233 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001132LUST**
FACILITY ID: **4001132**
FACILITY NAME: **UTA - CENTRAL DIVISION**
ADDRESS: **610 W 200 S**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **UTAH TRANSIT AUTHORITY**
ADDRESS: **PO BOX 30810**
SALT LAKE CITY, UT 84130

FACILITY DETAILS

PROJECT MANAGER: **MORGAN ATKINSON**
NOTIFICATION DATE: **4/4/2001**
CLOSED DATE: **4/5/2010**

PROJECT MANAGER: **MORGAN ATKINSON**
NOTIFICATION DATE: **12/6/2000**
CLOSED DATE: **2/4/2002**

PROJECT MANAGER: **MARK CRIM**
NOTIFICATION DATE: **3/21/1990**
CLOSED DATE: **1/3/1996**

CAUSE AND RELEASE

CAUSE OF RELEASE: **TANK FAILURE**
SUBSTANCE RELEASE: **USED OIL**
METHOD DETERMINED: **INVENTORY LOSS**

Back to Report Summary

Leaking Underground Storage Tanks (LUST)

MAP ID# 32

Distance from Property: 0.402 mi. (2,123 ft.) SSE
Elevation: 4,231 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000661LUST**
FACILITY ID: **4000661**
FACILITY NAME: **NOYCE TRANSFER CO**
ADDRESS: **736 W 300 S**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **WILLIAM L EMMEL**
ADDRESS: **1217 BRICKYARD RD #102**
SALT LAKE CITY, UT 84106

FACILITY DETAILS

PROJECT MANAGER: **[SHELLY QUICK]**
NOTIFICATION DATE: **8/1/1990**
CLOSED DATE: **6/5/1995**

CAUSE AND RELEASE

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **PERMANENT CLOSURE**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **NOT REPORTED**
METHOD DETERMINED: **NOT REPORTED**

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MAP ID# 33

Distance from Property: 0.415 mi. (2,191 ft.) E
Elevation: 4,237 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **UTD988066023**
DERR ID: **UTD988066023**
FACILITY NAME: **DESERET PAINT**
ADDRESS: **14 N. 600 W.**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
PROJECT MANAGER: **NOT REPORTED**
CONTACT PHONE: **NOT REPORTED**
PROJECT DESCRIPTION: **THE SITE WAS A PAINT COMPANY THAT ALLEGEDLY DISPOSED OF SOLVENTS AND PAINT WASTES IN TRENCHES ON SITE. POTENTIAL OF SOIL AND GROUNDWATER CONTAMINATION.**
EMERGENCY RESPONSE BRANCH: **NO**
NATIONAL PRIORITY LIST: **NO**
PROPOSED FOR NPL: **NO**
ARCHIVED FOR CERCLIS: **YES**

Back to Report Summary

Superfund Enterprise Management System Archived Site Inventory (SEMSARCH)

MAP ID# 33

Distance from Property: 0.415 mi. (2,191 ft.) E
Elevation: 4,237 ft. (Higher than TP)

FACILITY INFORMATION

EPA ID#: **UTD988066023**
SITE ID#: **0800005**
NAME: **DESERET PAINT**
ADDRESS: **14 N. 600 W.**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
FEDERAL FACILITY: **NOT A FEDERAL FACILITY**
NPL: **NOT ON THE NPL**
NON NPL STATUS: **NFRAP-SITE DOES NOT QUALIFY FOR THE NPL BASED ON EXISTING INFORMATION**
SEMS SEARCH: **CLICK HERE**

Below information was gathered from the prior NFRAP update completed in 10/2013 update:

ACTION	START DATE	COMPLETION DATE	RESPONSIBILITY
DS - DISCOVERY	**NOT REPORTED**	**6/24/1988**	**STATE (FUND)**
PA - PRELIMINARY ASSESSMENT	**NOT REPORTED**	**4/14/1989**	**STATE (FUND)**
SI - SITE INSPECTION	**NOT REPORTED**	**9/23/1992**	**STATE (FUND)**
VS - ARCHIVE SITE	**NOT REPORTED**	**9/23/1992**	**EPA IN-HOUSE**

ACTION DESCRIPTIONS

DS - (DISCOVERY) - THE PROCESS BY WHICH A POTENTIAL HAZARDOUS WASTE SITE IS BROUGHT TO THE ATTENTION OF THE EPA. THE PROCESS CAN OCCUR THROUGH THE USE OF SEVERAL MECHANISMS SUCH AS A PHONE CALL OR REFERRAL BY ANOTHER GOVERNMENT AGENCY.

PA - (PRELIMINARY ASSESSMENT) - COLLECTION OF DIVERSE EXISTING INFORMATION ABOUT THE SOURCE AND NATURE OF THE SITE HAZARD. IT IS EPA POLICY TO COMPLETE THE PRELIMINARY ASSESSMENT WITHIN ONE YEAR OF SITE DISCOVERY.

SI - (SITE INSPECTION) - THE PROCESS OF COLLECTING SITE DATA AND SAMPLES TO CHARACTERIZE THE SEVERITY OF THE HAZARD FOR THE HAZARD RANKING SCORE AND/OR ENFORCEMENT SUPPORT.

VS - (ARCHIVE SITE) - THE DECISION IS MADE THAT NO FURTHER ACTIVITY IS PLANNED AT THE SITE.

Back to Report Summary

Resource Conservation & Recovery Act - Corrective Action Facilities (RCRAC)

MAP ID# 34

Distance from Property: 0.416 mi. (2,196 ft.) E
Elevation: 4,235 ft. (Higher than TP)

FACILITY INFORMATION

EPA ID#: **UTD035348325**
NAME: **MYERS CONTAINER CORP**
ADDRESS: **49 SOUTH 600 WEST**
SALT LAKE CITY, UT 84101
CONTACT NAME: **JOHN MAUSSHARDT**
CONTACT ADDRESS: **49 SOUTH 600 WEST**
SALT LAKE CITY UT 84101
CONTACT PHONE: **801-322-3529**
NON-NOTIFIER: **NOT A NON-NOTIFIER**
DATE RECEIVED BY AGENCY: **02/22/2007**

OWNER TYPE: **PRIVATE**
OWNER NAME: **MR. ED EISEM**
OPERATOR TYPE: **NOT REPORTED**
OPERATOR NAME: **NOT REPORTED**

CERTIFICATION

CERTIFICATION NAME:	CERTIFICATION TITLE:	CERTIFICATION SIGNED DATE:
SEAN R REYNOLDS	**HAZ. MAT. SPEC.**	**02/25/1994**
DANA W ZANONE	**ENV. COMP. MGR**	**02/28/1992**

INDUSTRY CLASSIFICATION (NAICS)

81149 - OTHER PERSONAL AND HOUSEHOLD GOODS REPAIR AND MAINTENANCE

CURRENT ACTIVITY INFORMATION

GENERATOR STATUS: **NON-GENERATOR** LAST UPDATED DATE: **03/08/2007**
SUBJECT TO CORRECTIVE ACTION UNIVERSE: **NO**
TDSFs POTENTIALLY SUBJECT TO CORRECTIVE ACTION UNDER 3004 (u)/(v) UNIVERSE: **NO**
TDSFs ONLY SUBJECT TO CORRECTIVE ACTION UNDER DISCRETIONARY AUTHORITIES UNIVERSE: **NO**
NON TSDFs WHERE RCRA CORRECTIVE ACTION HAS BEEN IMPOSED UNIVERSE: **YES**
CORRECTIVE ACTION WORKLOAD UNIVERSE: **YES**

IMPORTER: **NO**
MIXED WASTE GENERATOR: **NO**
RECYCLER: **NO**
TRANSPORTER: **NO**
ONSITE BURNER EXEMPTION: **NO**
FURNACE EXEMPTION: **NO**
USED OIL REFINER: **NO**
USED OIL TRANSFER FACILITY: **NO**
UNDERGROUND INJECTION: **NO**
UNIVERSAL WASTE DESTINATION FACILITY: **NO**
TRANSFER FACILITY: **NO**
USED OIL FUEL BURNER: **NO**
USED OIL PROCESSOR: **NO**
USED OIL FUEL MARKETER TO BURNER: **NO**
SPECIFICATION USED OIL MARKETER: **NO**
USED OIL TRANSPORTER: **NO**

COMPLIANCE, MONITORING AND ENFORCEMENT INFORMATION

EVALUATIONS

11/05/1991	**CEI**	**COMPLIANCE EVALUATION INSPECTION ON-SITE**
08/03/1990	**FCI**	**FOCUSED COMPLIANCE INSPECTION**
06/01/1990	**FCI**	**FOCUSED COMPLIANCE INSPECTION**
09/20/1985	**FCI**	**FOCUSED COMPLIANCE INSPECTION**
08/28/1985	**FCI**	**FOCUSED COMPLIANCE INSPECTION**
07/03/1985	**CEI**	**COMPLIANCE EVALUATION INSPECTION ON-SITE**
05/06/1985	**FCI**	**FOCUSED COMPLIANCE INSPECTION**
04/04/1985	**FCI**	**FOCUSED COMPLIANCE INSPECTION**

06/12/1984	CEI COMPLIANCE EVALUATION INSPECTION ON-SITE

VIOLATIONS

11/05/1991	262.A GENERATORS - GENERAL
11/05/1991	268.A LDR - GENERAL
08/03/1990	262.A GENERATORS - GENERAL
06/12/1984	262.A GENERATORS - GENERAL

ENFORCEMENTS

02/05/1992	310 FINAL 3008(A) COMPLIANCE ORDER
08/03/1990	210 INITIAL 3008(A) COMPLIANCE
03/15/1985	310 FINAL 3008(A) COMPLIANCE ORDER
09/07/1984	120 WRITTEN INFORMAL
09/07/1984	210 INITIAL 3008(A) COMPLIANCE

HAZARDOUS WASTE

D001	IGNITABLE WASTE
D002	CORROSIVE WASTE
D007	CHROMIUM
D008	LEAD
F002	THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE,TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE,CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001,F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
F003	THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
F005	THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE,CARBON DISULFIDE, ISOBUTANOL, PYRIDINE,BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001,F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

UNIVERSAL WASTE **- NO UNIVERSAL WASTE REPORTED -**

CORRECTIVE ACTION AREA (RELEASE)

AREA NAME:	AIR:	GROUNDWATER:	SOIL:	SURFACE WASTE:
ENTIRE FACILITY	-----	-----	Y	-----

CORRECTIVE ACTION EVENT

CA EVENT:	DATE:	EVENT DESCRIPTION:
CA225NR	09/01/2000	STABILIZATION MEASURES EVALUATION-FACILITY NOT AMENABLE TO STABILIZATION
CA006OU	08/24/1999	TYPE OF UNIT - OPERABLE UNIT
CA075LO	09/04/1997	CA PRIORITIZATION-LOW CA PRIORITY
CA076LO	09/04/1997	EBOCS RANK
CA077LO	09/04/1997	OVERALL CA RANK

CA070NO	09/16/1996	DETERMINATION OF NEED FOR AN INVESTIGATION-INVESTIGATION IS NOT NECESSARY
CA725YE	09/16/1996	HUMAN EXPOSURES CONTROLLED DETERMINATION-YES, APPLICABLE AS OF THIS DATE
CA750YE	09/16/1996	RELEASE TO GW CONTROLLED DETERMINATION-YES, APPLICABLE AS OF THIS DATE
CA050	05/15/1985	RFA COMPLETED
CA100	03/15/1985	INVESTIGATION IMPOSITION

Back to Report Summary

Resource Conservation & Recovery Act - Subject to Corrective Action Facilities (RCRASUBC)

MAP ID# 35

Distance from Property: 0.418 mi. (2,207 ft.) ENE
Elevation: 4,234 ft. (Higher than TP)

FACILITY INFORMATION

EPA ID#: **UTD000818211**
NAME: **AMERICAN BARREL COMPANY**
ADDRESS: **600 WEST NORTH TEMPLE**
SALT LAKE CITY, UT 84116
CONTACT NAME: **JEFF TUCKER**
CONTACT ADDRESS: **1407 WEST NORTH TEMPLE**
SALT LAKE CITY UT 84116
CONTACT PHONE: **801-220-2989**
NON-NOTIFIER: **NOT A NON-NOTIFIER**
DATE RECEIVED BY AGENCY: **02/18/2010**

OWNER TYPE: **NOT REPORTED**
OWNER NAME: **EISEN EDWARD**
OPERATOR TYPE: **PRIVATE**
OPERATOR NAME: **PACIFICORP**

CERTIFICATION

CERTIFICATION NAME:	CERTIFICATION TITLE:	CERTIFICATION SIGNED DATE:
JEFF TUCKER	**PRINCIPAL ENGINEER**	**02/18/2010**
JEFF TUCKER	**PRINCIPAL ENGINEER**	**02/22/2007**

INDUSTRY CLASSIFICATION (NAICS)

221112 - FOSSIL FUEL ELECTRIC POWER GENERATION

CURRENT ACTIVITY INFORMATION

GENERATOR STATUS: **CONDITIONALLY EXEMPT SMALL QUANTITY GENERATOR** LAST UPDATED DATE: **09/16/2014**
SUBJECT TO CORRECTIVE ACTION UNIVERSE: **YES**
TDSFs POTENTIALLY SUBJECT TO CORRECTIVE ACTION UNDER 3004 (u)/(v) UNIVERSE: **NO**
TDSFs ONLY SUBJECT TO CORRECTIVE ACTION UNDER DISCRETIONARY AUTHORITIES UNIVERSE: **NO**
NON TSDFs WHERE RCRA CORRECTIVE ACTION HAS BEEN IMPOSED UNIVERSE: **NO**
CORRECTIVE ACTION WORKLOAD UNIVERSE: **NO**

IMPORTER: **NO**
MIXED WASTE GENERATOR: **NO**
RECYCLER: **NO**
TRANSPORTER: **NO**
ONSITE BURNER EXEMPTION: **NO**
FURNACE EXEMPTION: **NO**
USED OIL REFINER: **NO**
USED OIL TRANSFER FACILITY: **NO**
UNDERGROUND INJECTION: **NO**
UNIVERSAL WASTE DESTINATION FACILITY: **NO**
TRANSFER FACILITY: **NO**
USED OIL FUEL BURNER: **NO**
USED OIL PROCESSOR: **NO**
USED OIL FUEL MARKETER TO BURNER: **NO**
SPECIFICATION USED OIL MARKETER: **NO**
USED OIL TRANSPORTER: **NO**

COMPLIANCE, MONITORING AND ENFORCEMENT INFORMATION

EVALUATIONS

05/17/2007	**CAV COMPLIANCE ASSISTANCE VISIT**
01/08/2004	**CEI COMPLIANCE EVALUATION INSPECTION ON-SITE**
04/09/1990	**NRR NON-FINANCIAL RECORD REVIEW**
08/01/1986	**CEI COMPLIANCE EVALUATION INSPECTION ON-SITE**
05/27/1986	**CEI COMPLIANCE EVALUATION INSPECTION ON-SITE**

VIOLATIONS

08/01/1986	**262.A GENERATORS - GENERAL**
05/27/1986	**262.A GENERATORS - GENERAL**

ENFORCEMENTS **- NO ENFORCEMENTS REPORTED -**

HAZARDOUS WASTE

F002	**THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE,TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE,CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001,F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.**
F003	**THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.**
F004	**THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: CRESOLS, CRESYLIC ACID, AND NITROBENZENE; AND THE STILL BOTTOMS FROM THE RECOVERY OF THESE SOLVENTS; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001,F002, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.**
F005	**THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE,CARBON DISULFIDE, ISOBUTANOL, PYRIDINE,BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001,F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.**
K049	**SLOP OIL EMULSION SOLIDS FROM THE PETROLEUM REFINING INDUSTRY.**
U002	**2-PROPANONE (I)**
U002	**ACETONE (I)**
U019	**BENZENE (I,T)**
U112	**ACETIC ACID, ETHYL ESTER (I)**
U112	**ETHYL ACETATE (I)**
U159	**2-BUTANONE (I,T)**
U159	**METHYL ETHYL KETONE (MEK) (I,T)**
U220	**BENZENE, METHYL-**
U220	**TOLUENE**

UNIVERSAL WASTE **- NO UNIVERSAL WASTE REPORTED -**

CORRECTIVE ACTION AREA (RELEASE)

AREA NAME:	AIR:	GROUNDWATER:	SOIL:	SURFACE WASTE:
ENTIRE FACILITY	**-----**	**-----**	**-----**	**-----**

CORRECTIVE ACTION EVENT

CA EVENT:	DATE:	EVENT DESCRIPTION:
CA225NR	**10/03/1997**	**STABILIZATION MEASURES EVALUATION-FACILITY NOT AMENABLE TO STABILIZATION**
CA075LO	**09/04/1997**	**CA PRIORITIZATION-LOW CA PRIORITY**
CA050	**09/16/1996**	**RFA COMPLETED**
CA070NO	**09/16/1996**	**DETERMINATION OF NEED FOR AN INVESTIGATION-INVESTIGATION IS NOT NECESSARY**
CA076LO	**09/16/1996**	**EBOCS RANK**
CA077LO	**09/16/1996**	**OVERALL CA RANK**

CA210SF	09/16/1996	REFERRED TO A NON-RCRA AUTHORITY-REFERRED TO CERCLA
CA725YE	09/16/1996	HUMAN EXPOSURES CONTROLLED DETERMINATION-YES, APPLICABLE AS OF THIS DATE
CA750YE	09/16/1996	RELEASE TO GW CONTROLLED DETERMINATION-YES, APPLICABLE AS OF THIS DATE

Back to Report Summary

Resource Conservation & Recovery Act - Non-CORRACTS Treatment, Storage & Disposal Facilities (RCRAT)

MAP ID# 35

Distance from Property: 0.418 mi. (2,207 ft.) ENE
Elevation: 4,234 ft. (Higher than TP)

FACILITY INFORMATION

EPA ID#: **UTD000818211**
NAME: **AMERICAN BARREL COMPANY**
ADDRESS: **600 WEST NORTH TEMPLE**
SALT LAKE CITY, UT 84116
CONTACT NAME: **JEFF TUCKER**
CONTACT ADDRESS: **1407 WEST NORTH TEMPLE**
SALT LAKE CITY UT 84116
CONTACT PHONE: **801-220-2989**
NON-NOTIFIER: **NOT A NON-NOTIFIER**
DATE RECEIVED BY AGENCY: **02/18/2010**

OWNER TYPE: **NOT REPORTED**
OWNER NAME: **EISEN EDWARD**
OPERATOR TYPE: **PRIVATE**
OPERATOR NAME: **PACIFICORP**

CERTIFICATION

CERTIFICATION NAME:	CERTIFICATION TITLE:	CERTIFICATION SIGNED DATE:
JEFF TUCKER	**PRINCIPAL ENGINEER**	**02/18/2010**
JEFF TUCKER	**PRINCIPAL ENGINEER**	**02/22/2007**

INDUSTRY CLASSIFICATION (NAICS)

221112 - FOSSIL FUEL ELECTRIC POWER GENERATION

CURRENT ACTIVITY INFORMATION

GENERATOR STATUS: **CONDITIONALLY EXEMPT SMALL QUANTITY GENERATOR** LAST UPDATED DATE: **09/16/2014**
SUBJECT TO CORRECTIVE ACTION UNIVERSE: **YES**
TDSFs POTENTIALLY SUBJECT TO CORRECTIVE ACTION UNDER 3004 (u)/(v) UNIVERSE: **NO**
TDSFs ONLY SUBJECT TO CORRECTIVE ACTION UNDER DISCRETIONARY AUTHORITIES UNIVERSE: **NO**
NON TSDFs WHERE RCRA CORRECTIVE ACTION HAS BEEN IMPOSED UNIVERSE: **NO**
CORRECTIVE ACTION WORKLOAD UNIVERSE: **NO**

IMPORTER: **NO**
MIXED WASTE GENERATOR: **NO**
RECYCLER: **NO**
TRANSPORTER: **NO**
ONSITE BURNER EXEMPTION: **NO**
FURNACE EXEMPTION: **NO**
USED OIL REFINER: **NO**
USED OIL TRANSFER FACILITY: **NO**

UNDERGROUND INJECTION: **NO**
UNIVERSAL WASTE DESTINATION FACILITY: **NO**
TRANSFER FACILITY: **NO**
USED OIL FUEL BURNER: **NO**
USED OIL PROCESSOR: **NO**
USED OIL FUEL MARKETER TO BURNER: **NO**
SPECIFICATION USED OIL MARKETER: **NO**
USED OIL TRANSPORTER: **NO**

COMPLIANCE, MONITORING AND ENFORCEMENT INFORMATION

EVALUATIONS

05/17/2007	**CAV COMPLIANCE ASSISTANCE VISIT**
01/08/2004	**CEI COMPLIANCE EVALUATION INSPECTION ON-SITE**
04/09/1990	**NRR NON-FINANCIAL RECORD REVIEW**
08/01/1986	**CEI COMPLIANCE EVALUATION INSPECTION ON-SITE**
05/27/1986	**CEI COMPLIANCE EVALUATION INSPECTION ON-SITE**

VIOLATIONS

08/01/1986	**262.A GENERATORS - GENERAL**
05/27/1986	**262.A GENERATORS - GENERAL**

ENFORCEMENTS **- NO ENFORCEMENTS REPORTED -**

HAZARDOUS WASTE

F002	**THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE,TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE,CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001,F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.**
F003	**THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.**
F004	**THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: CRESOLS, CRESYLIC ACID, AND NITROBENZENE; AND THE STILL BOTTOMS FROM THE RECOVERY OF THESE SOLVENTS; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001,F002, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.**
F005	**THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE,CARBON DISULFIDE, ISOBUTANOL, PYRIDINE,BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001,F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.**
K049	**SLOP OIL EMULSION SOLIDS FROM THE PETROLEUM REFINING INDUSTRY.**
U002	**2-PROPANONE (I)**
U002	**ACETONE (I)**
U019	**BENZENE (I,T)**
U112	**ACETIC ACID, ETHYL ESTER (I)**
U112	**ETHYL ACETATE (I)**
U159	**2-BUTANONE (I,T)**
U159	**METHYL ETHYL KETONE (MEK) (I,T)**
U220	**BENZENE, METHYL-**
U220	**TOLUENE**

UNIVERSAL WASTE **- NO UNIVERSAL WASTE REPORTED -**

CORRECTIVE ACTION AREA (RELEASE)

AREA NAME:	AIR:	GROUNDWATER:	SOIL:	SURFACE WASTE:
ENTIRE FACILITY	**-----**	**-----**	**-----**	**-----**

CORRECTIVE ACTION EVENT

CA EVENT:	DATE:	EVENT DESCRIPTION:
CA225NR	**10/03/1997**	**STABILIZATION MEASURES EVALUATION-FACILITY NOT AMENABLE TO STABILIZATION**
CA075LO	**09/04/1997**	**CA PRIORITIZATION-LOW CA PRIORITY**
CA050	**09/16/1996**	**RFA COMPLETED**
CA070NO	**09/16/1996**	**DETERMINATION OF NEED FOR AN INVESTIGATION-INVESTIGATION IS NOT NECESSARY**
CA076LO	**09/16/1996**	**EBOCS RANK**
CA077LO	**09/16/1996**	**OVERALL CA RANK**

CA210SF	09/16/1996	REFERRED TO A NON-RCRA AUTHORITY-REFERRED TO CERCLA
CA725YE	09/16/1996	HUMAN EXPOSURES CONTROLLED DETERMINATION-YES, APPLICABLE AS OF THIS DATE
CA750YE	09/16/1996	RELEASE TO GW CONTROLLED DETERMINATION-YES, APPLICABLE AS OF THIS DATE

Back to Report Summary

MAP ID# 36

Distance from Property: 0.432 mi. (2,281 ft.) ESE
Elevation: 4,233 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **VCP-C016**
FACILITY ID: **C016**
FACILITY NAME: **SALT LAKE CITY INTERMODAL HUB**
ADDRESS: **600 WEST 200 SOUTH**
SALT LAKE CITY, UT 84111
COUNTY: **SALT LAKE**
STATUS: **NOT REPORTED**
ACRES: **NOT REPORTED**
AMENDED AGREEMENT DATE: **5/1/2003**
ORIGINAL CERTIFICATE OF COMPLETION DATE: **2/2/2007**
AMENDED CERTIFICATE OF COMPLETION DATE: **NOT REPORTED**
EPA CERCLIS ARCHIVE DATE: **NOT REPORTED**
TERMINATION DATE: **NOT REPORTED**
PROJECT MANAGER: **KRISTEN (LEIGH) ANDERSON**
NOTES: **NOT REPORTED**

CERCLA BRANCH MAJOR ACTIVITIES

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT RECEIVED**
START DATE: **10/24/2014**
COMPLETION DATE: **10/24/2014**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT REVIEWED**
START DATE: **10/24/2014**
COMPLETION DATE: **11/5/2014**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN FIELD WORK**
START DATE: **9/15/2014**
COMPLETION DATE: **9/15/2014**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT ACCEPTED**
START DATE: **12/12/2013**
COMPLETION DATE: **12/12/2013**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT RECEIVED**
START DATE: **11/26/2013**
COMPLETION DATE: **11/26/2013**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT REVIEWED**
START DATE: **11/26/2013**
COMPLETION DATE: **12/12/2013**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN FIELD WORK**

START DATE: **9/4/2013**
COMPLETION DATE: **9/4/2013**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT ACCEPTED**
START DATE: **2/21/2013**
COMPLETION DATE: **2/21/2013**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT RECEIVED**
START DATE: **12/20/2012**
COMPLETION DATE: **12/20/2012**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT REVIEWED**
START DATE: **12/20/2012**
COMPLETION DATE: **2/21/2013**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN FIELD WORK**
START DATE: **9/14/2012**
COMPLETION DATE: **9/14/2012**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT ACCEPTED**
START DATE: **3/7/2012**
COMPLETION DATE: **3/7/2012**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT ACCEPTED**
START DATE: **11/30/2011**
COMPLETION DATE: **11/30/2011**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT RECEIVED**
START DATE: **11/18/2011**
COMPLETION DATE: **11/18/2011**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT REVIEWED**
START DATE: **11/18/2011**
COMPLETION DATE: **11/30/2011**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT ACCEPTED**
START DATE: **11/5/2011**
COMPLETION DATE: **11/5/2011**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT ACCEPTED**
START DATE: **2/9/2010**
COMPLETION DATE: **2/8/2010**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT RECEIVED**
START DATE: **12/15/2009**
COMPLETION DATE: **12/15/2009**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT REVIEWED**
START DATE: **12/15/2009**
COMPLETION DATE: **2/9/2010**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN COMMENTS SENT**
START DATE: **7/23/2008**
COMPLETION DATE: **7/23/2008**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN FIELD WORK**
START DATE: **7/21/2008**
COMPLETION DATE: **7/21/2008**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT ACCEPTED**
START DATE: **2/7/2008**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT RECEIVED**
START DATE: **1/16/2008**
COMPLETION DATE: **1/16/2008**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT REVIEWED**
START DATE: **1/16/2008**
COMPLETION DATE: **2/7/2008**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT REPORT RECEIVED**
START DATE: **7/31/2007**
COMPLETION DATE: **7/31/2007**

MAJOR ACTIVITY STATE DESCRIPTION: **COC ISSUED**
START DATE: **2/2/2007**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN ACCEPTED**
START DATE: **2/2/2007**
COMPLETION DATE: **2/2/2007**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION REPORT ACCEPTED**
START DATE: **2/2/2007**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION REPORT ACCEPTED**
START DATE: **1/16/2007**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN RECEIVED**
START DATE: **1/16/2007**
COMPLETION DATE: **1/16/2007**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN REVIEWED**
START DATE: **1/16/2007**
COMPLETION DATE: **2/2/2007**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION FIELD WORK**
START DATE: **11/22/2006**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN COMMENTS SENT**
START DATE: **6/1/2006**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN RECEIVED**
START DATE: **4/18/2005**
COMPLETION DATE: **4/18/2005**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN ACCEPTED**
START DATE: **8/23/2004**
COMPLETION DATE: **8/23/2004**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN RECEIVED**
START DATE: **8/23/2004**
COMPLETION DATE: **8/23/2004**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN COMMENTS SENT**
START DATE: **4/9/2004**
COMPLETION DATE: **4/9/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN RECEIVED**
START DATE: **12/11/2003**
COMPLETION DATE: **12/11/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE MANAGEMENT PLAN REVIEWED**
START DATE: **12/11/2003**

COMPLETION DATE: **4/9/2004**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT RECEIVED**
START DATE: **11/17/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN ADDENDUM ACCEPTED**
START DATE: **11/12/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN RECEIVED**
START DATE: **10/17/2003**
COMPLETION DATE: **10/17/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN REVIEWED**
START DATE: **10/17/2003**
COMPLETION DATE: **11/12/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION REPORT ACCEPTED**
START DATE: **9/26/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **PUBLIC COMMENT RECEIVED**
START DATE: **9/12/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **PUBLIC OUTREACH**
START DATE: **8/26/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **PUBLIC COMMENT RECEIVED**
START DATE: **8/22/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **PUBLIC COMMENT PERIOD**
START DATE: **8/13/2003**
COMPLETION DATE: **9/13/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN COMMENTS SENT**
START DATE: **8/12/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN RECEIVED**

START DATE: **8/11/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN COMMENTS SENT**
START DATE: **8/8/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **GROUND WATER MONITORING REPORT RECEIVED**
START DATE: **7/25/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN ACCEPTED**
START DATE: **6/13/2003**
COMPLETION DATE: **9/26/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT ACCEPTED**
START DATE: **5/28/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **VCP AGREEMENT AMENDED**
START DATE: **5/1/2003**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT RECEIVED**
START DATE: **4/17/2003**
COMPLETION DATE: **4/17/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT ADDENDUM**
START DATE: **4/14/2003**
COMPLETION DATE: **4/14/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT RECEIVED**
START DATE: **3/3/2003**
COMPLETION DATE: **3/3/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT REVIEWED**
START DATE: **3/3/2003**
COMPLETION DATE: **5/28/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN COMMENTS SENT**
START DATE: **1/31/2003**
COMPLETION DATE: **1/31/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT RECEIVED**
START DATE: **1/28/2003**
COMPLETION DATE: **1/28/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION FIELD WORK**
START DATE: **12/2/2002**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN RECEIVED**
START DATE: **11/19/2002**
COMPLETION DATE: **11/19/2002**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN REVIEWED**
START DATE: **11/19/2002**
COMPLETION DATE: **1/31/2003**

MAJOR ACTIVITY STATE DESCRIPTION: **GROUND WATER MONITORING WORK PLAN ACCEPTED**
START DATE: **10/18/2002**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT RECEIVED**
START DATE: **10/2/2002**
COMPLETION DATE: **10/2/2002**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION FIELD WORK**
START DATE: **8/7/2002**
COMPLETION DATE: **8/7/2002**

MAJOR ACTIVITY STATE DESCRIPTION: **GROUND WATER MONITORING WORK PLAN RECEIVED**
START DATE: **8/7/2002**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN ACCEPTED**
START DATE: **6/28/2002**
COMPLETION DATE: **6/28/2002**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT COMMENTS SENT**
START DATE: **6/17/2002**
COMPLETION DATE: **6/17/2002**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN ADDENDUM ACCEPTED**
START DATE: **6/3/2002**
COMPLETION DATE: **6/3/2002**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT RECEIVED**
START DATE: **5/28/2002**
COMPLETION DATE: **5/28/2002**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT REVIEWED**
START DATE: **5/28/2002**
COMPLETION DATE: **6/17/2002**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION REPORT RECEIVED**
START DATE: **5/21/2002**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN COMMENTS SENT**
START DATE: **4/16/2002**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION FIELD WORK**
START DATE: **1/1/2002**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN ACCEPTED**
START DATE: **12/14/2001**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN RECEIVED**
START DATE: **12/5/2001**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN COMMENTS SENT**
START DATE: **11/15/2001**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN RESPONSE RECEIVED**
START DATE: **8/30/2001**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **GROUND WATER MONITORING REPORT RECEIVED**
START DATE: **8/1/2001**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **GROUND WATER MONITORING REPORT RECEIVED**
START DATE: **5/30/2001**

COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **GROUND WATER MONITORING WORK PLAN RESPONSE RECEIVED**
START DATE: **5/25/2001**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **GROUND WATER MONITORING WORK PLAN COMMENTS SENT**
START DATE: **4/12/2001**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **GROUND WATER MONITORING WORK PLAN RECEIVED**
START DATE: **2/9/2001**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN COMMENTS SENT**
START DATE: **1/26/2001**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN RESPONSE RECEIVED**
START DATE: **11/6/2000**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN RESPONSE RECEIVED**
START DATE: **8/9/2000**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT ACCEPTED**
START DATE: **4/3/2000**
COMPLETION DATE: **4/3/2000**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN COMMENTS SENT**
START DATE: **4/3/2000**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **RISK ASSESSMENT REPORT RECEIVED**
START DATE: **3/9/2000**
COMPLETION DATE: **3/9/2000**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION WORK PLAN RECEIVED**
START DATE: **3/9/2000**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **RISK ASSESSMENT REPORT REVIEWED**

START DATE: **3/9/2000**
COMPLETION DATE: **4/3/2000**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT RECEIVED**
START DATE: **3/1/2000**
COMPLETION DATE: **3/1/2000**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT REVIEWED**
START DATE: **3/1/2000**
COMPLETION DATE: **4/3/2000**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION FIELD WORK**
START DATE: **11/18/1999**
COMPLETION DATE: **11/18/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN RESPONSE RECEIVED**
START DATE: **11/17/1999**
COMPLETION DATE: **11/17/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN COMMENTS SENT**
START DATE: **11/16/1999**
COMPLETION DATE: **11/16/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN ADDENDUM ACCEPTED**
START DATE: **11/15/1999**
COMPLETION DATE: **11/15/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN RESPONSE RECEIVED**
START DATE: **11/12/1999**
COMPLETION DATE: **11/12/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN COMMENTS SENT**
START DATE: **10/22/1999**
COMPLETION DATE: **10/22/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION FIELD WORK**
START DATE: **10/18/1999**
COMPLETION DATE: **10/22/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN COMMENTS SENT**
START DATE: **10/18/1999**
COMPLETION DATE: **10/18/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN RESPONSE RECEIVED**
START DATE: **10/6/1999**
COMPLETION DATE: **10/6/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN RESPONSE RECEIVED**
START DATE: **8/31/1999**
COMPLETION DATE: **8/31/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN RECEIVED**
START DATE: **8/31/1999**
COMPLETION DATE: **8/31/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN REVIEWED**
START DATE: **8/31/1999**
COMPLETION DATE: **10/18/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT COMMENTS SENT**
START DATE: **7/9/1999**
COMPLETION DATE: **7/9/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT ADDENDUM**
START DATE: **6/10/1999**
COMPLETION DATE: **6/10/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **ENVIRONMENTAL ASSESSMENT REVIEWED**
START DATE: **6/9/1999**
COMPLETION DATE: **7/9/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT RECEIVED**
START DATE: **6/8/1999**
COMPLETION DATE: **6/8/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT RECEIVED**
START DATE: **5/24/1999**
COMPLETION DATE: **5/24/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION REPORT REVIEWED**
START DATE: **5/24/1999**
COMPLETION DATE: **7/9/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN COMMENTS SENT**
START DATE: **5/12/1999**
COMPLETION DATE: **NOT REPORTED**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION FIELD WORK**
START DATE: **5/7/1999**
COMPLETION DATE: **5/7/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN ADDENDUM ACCEPTED**
START DATE: **5/6/1999**
COMPLETION DATE: **5/6/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN ADDENDUM ACCEPTED**
START DATE: **5/3/1999**
COMPLETION DATE: **5/3/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **VCP AGREEMENT EXECUTED**
START DATE: **4/29/1999**
COMPLETION DATE: **4/29/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN RECEIVED**
START DATE: **4/29/1999**
COMPLETION DATE: **4/29/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **ENVIRONMENTAL ASSESSMENT COMMENTS SENT**
START DATE: **4/27/1999**
COMPLETION DATE: **4/27/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **SITE CHARACTERIZATION WORK PLAN REVIEWED**
START DATE: **4/19/1999**
COMPLETION DATE: **5/3/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **ENVIRONMENTAL ASSESSMENT REVIEWED**
START DATE: **4/7/1999**
COMPLETION DATE: **4/16/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **VOLUNTARY CLEANUP SITE APPLICATION RECEIVED**
START DATE: **3/22/1999**
COMPLETION DATE: **3/22/1999**

MAJOR ACTIVITY STATE DESCRIPTION: **REMEDIAL ACTION REPORT REVIEWED**
START DATE: **1/0/1900**
COMPLETION DATE: **NOT REPORTED**

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MAP ID# 37

Distance from Property: 0.441 mi. (2,328 ft.) ESE
Elevation: 4,233 ft. (Higher than TP)

SITE INFORMATION

ID#: **215961**

NAME: **CENTRO CIVICO MEXICANO**

ADDRESS: **155 SOUTH 600 WEST**
SALT LAKE CITY, UT 84101

TYPE FUNDING: **N/A**

PREDOMINANT PAST USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**NOT REPORTED**	**1.22**	**NOT REPORTED**

FUTURE USE (ACREAGE):

GREENSPACE:	RESIDENTIAL:	COMMERCIAL:	INDUSTRIAL:
NOT REPORTED	**0.38**	**0.84**	**NOT REPORTED**

PROPERTY HIGHLIGHT:

NOT REPORTED

PROPERTY SIZE (Acres): **1.22**

CURRENT OWNER: **CENTRO CIVICO MEXICANO**

PROPERTY DESCRIPTION/ FORMER USE:

THE PROPERTY IS 1.22 ACRES WITH A BUILDING USED AS A CIVIC CENTER. THE AREA WAS HISTORICALLY INDUSTRIAL INCLUDING FOUNDARIES AND MACHINE SHOPS. PAHS AND METALS ARE PRESENT.

CONTAMINATE(S): **ASBESTOS, VOCS, LEAD, OTHER METALS, PAHS**

CONTAMINATE(S) CLEANED UP: **NOT REPORTED**

MEDIA(S) AFFECTED: **SOIL, GROUND WATER**

MEDIA(S) CLEANED UP: **NOT REPORTED**

TYPE OF BROWNFIELD GRANT: **TBA**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **SUPPLEMENTAL ASSESSMENT**

ASSESSMENT START DATE: **12/18/2015 0:00**

ASSESSMENT COMPLETION DATE: **4/29/2016 0:00**

CLEANUP REQUIRED: **YES**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **NO**

TYPE OF BROWNFIELD GRANT: **TBA**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **CLEANUP PLANNING**

ASSESSMENT START DATE: **10/16/2015 0:00**

ASSESSMENT COMPLETION DATE: **4/29/2016 0:00**

CLEANUP REQUIRED: **YES**

STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**

STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**

PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**

ARE INSTITUTIONAL CONTROLS REQUIRED?: **NO**

TYPE OF BROWNFIELD GRANT: **TBA**

ENVIRONMENTAL ASSESSMENT ACTIVITY: **PHASE II ENVIRONMENTAL ASSESSMENT**
ASSESSMENT START DATE: **10/16/2015 0:00**
ASSESSMENT COMPLETION DATE: **12/18/2015 0:00**
CLEANUP REQUIRED: **YES**
STATE & TRIBAL ENROLLMENT ID: **NOT REPORTED**
STATE & TRIBAL ENROLLMENT DATE: **NOT REPORTED**
PROPERTY ENROLLED IN A STATE & TRIBAL PROGRAM?: **NOT REPORTED**
ARE INSTITUTIONAL CONTROLS REQUIRED?: **NO**

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Voluntary Cleanup Program Sites (VCP)

MAP ID# 37

Distance from Property: 0.441 mi. (2,328 ft.) ESE
Elevation: 4,233 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **VCP-C087**
FACILITY ID: **C087**
FACILITY NAME: **CENTRO CIVICO MEXICANO**
ADDRESS: **155 SOUTH 600 WEST**
SALT LAKE CITY, UT 84101
COUNTY: **SALT LAKE**
STATUS: **NOT REPORTED**
ACRES: **NOT REPORTED**
AMENDED AGREEMENT DATE: **NOT REPORTED**
ORIGINAL CERTIFICATE OF COMPLETION DATE: **NOT REPORTED**
AMENDED CERTIFICATE OF COMPLETION DATE: **NOT REPORTED**
EPA CERCLIS ARCHIVE DATE: **NOT REPORTED**
TERMINATION DATE: **NOT REPORTED**
PROJECT MANAGER: **JOSEPH KATZ**
NOTES: **NOT REPORTED**

CERCLA BRANCH MAJOR ACTIVITIES NO CERCLA BRANCH MAJOR ACTIVITIES REPORTED

Back to Report Summary

Leaking Underground Storage Tanks (LUST)

MAP ID# 38

Distance from Property: 0.447 mi. (2,360 ft.) SSE
Elevation: 4,231 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **4001878LUST**
FACILITY ID: **4001878**
FACILITY NAME: **MARK STEEL**
ADDRESS: **751 W 300 S**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
OWNER NAME: **MARK STEEL**
ADDRESS: **751 W 300 S**
SALT LAKE CITY, UT 84104

FACILITY DETAILS

PROJECT MANAGER: **[EVAN SULLIVAN]**
NOTIFICATION DATE: **1/5/1993**
CLOSED DATE: **4/26/1995**

CAUSE AND RELEASE

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **PERMANENT CLOSURE**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **DIESEL**
METHOD DETERMINED: **NOT REPORTED**

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MAP ID# 39

Distance from Property: 0.472 mi. (2,492 ft.) W
Elevation: 4,225 ft. (Lower than TP)

FACILITY INFORMATION

GEOSEARCH ID: **UTD980807234**
DERR ID: **UTD980807234**
FACILITY NAME: **MOUNTAIN FUELS SUPPLY CO.-OPERATIONS CTR**
ADDRESS: **100 SOUTH 1078 WEST**
SALT LAKE CITY, UT 84104
COUNTY: **SALT LAKE**
PROJECT MANAGER: **CHAD GILGEN**
CONTACT PHONE: **8015364237**
PROJECT DESCRIPTION: **SITE IF FORMER COAL GASIFICATION PLANT, 1906-1929.**
EMERGENCY RESPONSE BRANCH: **NO**
NATIONAL PRIORITY LIST: **NO**
PROPOSED FOR NPL: **NO**
ARCHIVED FOR CERCLIS: **YES**

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Superfund Enterprise Management System Archived Site Inventory (SEMSARCH)

MAP ID# 39

Distance from Property: 0.472 mi. (2,492 ft.) W
Elevation: 4,225 ft. (Lower than TP)

FACILITY INFORMATION

EPA ID#: **UTD980807234**

SITE ID#: **0800693**

NAME: **MOUNTAIN FUELS SUPPLY CO.-OPERATIONS CTR**

ADDRESS: **100 SOUTH 1078 WEST**
SALT LAKE CITY, UT 84104

COUNTY: **SALT LAKE**

FEDERAL FACILITY: **NOT A FEDERAL FACILITY**

NPL: **NOT ON THE NPL**

NON NPL STATUS: **NFRAP-SITE DOES NOT QUALIFY FOR THE NPL BASED ON EXISTING INFORMATION**

SEMS SEARCH: **CLICK HERE**

Below information was gathered from the prior NFRAP update completed in 10/2013 update:

ACTION	START DATE	COMPLETION DATE	RESPONSIBILITY
DS - DISCOVERY	**NOT REPORTED**	**10/1/1983**	**EPA FUND**
PA - PRELIMINARY ASSESSMENT	**NOT REPORTED**	**12/1/1984**	**EPA FUND**
SI - SITE INSPECTION	**NOT REPORTED**	**10/2/1990**	**STATE (FUND)**
VS - ARCHIVE SITE	**NOT REPORTED**	**10/2/1990**	**EPA IN-HOUSE**

ACTION DESCRIPTIONS

DS - (DISCOVERY) - THE PROCESS BY WHICH A POTENTIAL HAZARDOUS WASTE SITE IS BROUGHT TO THE ATTENTION OF THE EPA. THE PROCESS CAN OCCUR THROUGH THE USE OF SEVERAL MECHANISMS SUCH AS A PHONE CALL OR REFERRAL BY ANOTHER GOVERNMENT AGENCY.

PA - (PRELIMINARY ASSESSMENT) - COLLECTION OF DIVERSE EXISTING INFORMATION ABOUT THE SOURCE AND NATURE OF THE SITE HAZARD. IT IS EPA POLICY TO COMPLETE THE PRELIMINARY ASSESSMENT WITHIN ONE YEAR OF SITE DISCOVERY.

SI - (SITE INSPECTION) - THE PROCESS OF COLLECTING SITE DATA AND SAMPLES TO CHARACTERIZE THE SEVERITY OF THE HAZARD FOR THE HAZARD RANKING SCORE AND/OR ENFORCEMENT SUPPORT.

VS - (ARCHIVE SITE) - THE DECISION IS MADE THAT NO FURTHER ACTIVITY IS PLANNED AT THE SITE.

Back to Report Summary

MAP ID# 40

Distance from Property: 0.491 mi. (2,592 ft.) WNW
Elevation: 4,228 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **UTD981547003**
DERR ID: **UTD981547003**
FACILITY NAME: **BARBER COMPANY TAR PRODUCTS**
ADDRESS: **110O WEST NORTH TEMPLE**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
PROJECT MANAGER: **NOT REPORTED**
CONTACT PHONE: **NOT REPORTED**
PROJECT DESCRIPTION: **THE BARBER COMPANY TAR PRODUCTS ENCOMPASSES APPROXIMATELY 1 ACRE IN SALT LAKE COUNTY. THE BCTP WAS A FORMER COAL TAR REFINERY IN THE EARLY 1900'S. FROM 1915 TO 1928, ROOFING MATERIALS AND TAR PRODUCTS WERE MANUFACTURED ON SITE. THE PROPERTY WAS ALSO USED AS A CONCRETE BATCH MIXING PLANT IN THE EARLY 1940S. THE PROPERTY IS CURRENTLY OWNED BY UTAH POWER AND LIGHT. THE SITE HAS BEEN INACTIVE SINCE THE MID 1970S. BUILDINGS ON SITE HAVE BEEN REMOVED AND THE VACANT LAND IS USED FOR STORAGE OF CONSTRUCTION RUBBLE. LAND USE IN THE FOUR-MILE SITE AREA IS INDUSTRIAL, COMMERCIAL, AND RESIDENTIAL WITH HEAVY INDUSTRIES PRESENT TO THE WEST.**
EMERGENCY RESPONSE BRANCH: **NO**
NATIONAL PRIORITY LIST: **NO**
PROPOSED FOR NPL: **NO**
ARCHIVED FOR CERCLIS: **YES**

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Superfund Enterprise Management System Archived Site Inventory (SEMSARCH)

MAP ID# 40

Distance from Property: 0.491 mi. (2,592 ft.) WNW
Elevation: 4,228 ft. (Higher than TP)

FACILITY INFORMATION

EPA ID#: **UTD981547003**

SITE ID#: **0800741**

NAME: **BARBER COMPANY TAR PRODUCTS**

ADDRESS: **1100 WEST NORTH TEMPLE**
SALT LAKE CITY, UT 84116

COUNTY: **SALT LAKE**

FEDERAL FACILITY: **NOT A FEDERAL FACILITY**

NPL: **NOT ON THE NPL**

NON NPL STATUS: **NFRAP-SITE DOES NOT QUALIFY FOR THE NPL BASED ON EXISTING INFORMATION**

SEMS SEARCH: **CLICK HERE**

Below information was gathered from the prior NFRAP update completed in 10/2013 update:

ACTION	START DATE	COMPLETION DATE	RESPONSIBILITY
DS - DISCOVERY	**NOT REPORTED**	**1/12/1987**	**EPA FUND**
PA - PRELIMINARY ASSESSMENT	**NOT REPORTED**	**10/22/1987**	**STATE (FUND)**
SI - SITE INSPECTION	**NOT REPORTED**	**10/25/1990**	**EPA FUND**
VS - ARCHIVE SITE	**NOT REPORTED**	**9/26/1995**	**EPA IN-HOUSE**

ACTION DESCRIPTIONS

DS - (DISCOVERY) - THE PROCESS BY WHICH A POTENTIAL HAZARDOUS WASTE SITE IS BROUGHT TO THE ATTENTION OF THE EPA. THE PROCESS CAN OCCUR THROUGH THE USE OF SEVERAL MECHANISMS SUCH AS A PHONE CALL OR REFERRAL BY ANOTHER GOVERNMENT AGENCY.

PA - (PRELIMINARY ASSESSMENT) - COLLECTION OF DIVERSE EXISTING INFORMATION ABOUT THE SOURCE AND NATURE OF THE SITE HAZARD. IT IS EPA POLICY TO COMPLETE THE PRELIMINARY ASSESSMENT WITHIN ONE YEAR OF SITE DISCOVERY.

SI - (SITE INSPECTION) - THE PROCESS OF COLLECTING SITE DATA AND SAMPLES TO CHARACTERIZE THE SEVERITY OF THE HAZARD FOR THE HAZARD RANKING SCORE AND/OR ENFORCEMENT SUPPORT.

VS - (ARCHIVE SITE) - THE DECISION IS MADE THAT NO FURTHER ACTIVITY IS PLANNED AT THE SITE.

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Leaking Underground Storage Tanks (LUST)

MAP ID# 41

Distance from Property: 0.497 mi. (2,624 ft.) NNW
Elevation: 4,226 ft. (Equal to TP)

FACILITY INFORMATION

GEOSEARCH ID: **4000856LUST**
FACILITY ID: **4000856**
FACILITY NAME: **S.L.C. FIRE DEPT. STATION #7**
ADDRESS: **273 N 1000 W**
SALT LAKE CITY, UT 84116
COUNTY: **SALT LAKE**
OWNER NAME: **SALT LAKE CITY FLEET MANAGEMENT**
ADDRESS: **1990 W 500 S**
SALT LAKE CITY, UT 84104

FACILITY DETAILS

PROJECT MANAGER: **[MIKE PFEIFFER]**
NOTIFICATION DATE: **3/15/1990**
CLOSED DATE: **12/27/1995**

CAUSE AND RELEASE

CAUSE OF RELEASE: **OTHER: HOLES IN TANKS**
SUBSTANCE RELEASE: **GASOLINE**
METHOD DETERMINED: **PERMANENT CLOSURE**

CAUSE OF RELEASE: **OTHER: HOLES IN TANKS**
SUBSTANCE RELEASE: **DIESEL**
METHOD DETERMINED: **PERMANENT CLOSURE**

CAUSE OF RELEASE: **UNKNOWN**
SUBSTANCE RELEASE: **NOT REPORTED**
METHOD DETERMINED: **NOT REPORTED**

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Unlocated Sites Summary

This list contains sites that could not be mapped due to limited or incomplete address information.

No Records Found

AIRSAFS Aerometric Information Retrieval System / Air Facility Subsystem

VERSION DATE: 10/20/14

The United States Environmental Protection Agency (EPA) modified the Aerometric Information Retrieval System (AIRS) to a database that exclusively tracks the compliance of stationary sources of air pollution with EPA regulations: the Air Facility Subsystem (AFS). Since this change in 2001, the management of the AIRS/AFS database was assigned to EPA's Office of Enforcement and Compliance Assurance.

BRS Biennial Reporting System

VERSION DATE: 12/31/11

The United States Environmental Protection Agency (EPA), in cooperation with the States, biennially collects information regarding the generation, management, and final disposition of hazardous wastes regulated under the Resource Conservation and Recovery Act of 1976 (RCRA), as amended. The Biennial Report captures detailed data on the generation of hazardous waste from large quantity generators and data on waste management practices from treatment, storage and disposal facilities. Currently, the EPA states that data collected between 1991 and 1997 was originally a part of the defunct Biennial Reporting System and is now incorporated into the RCRAInfo data system.

CDL Clandestine Drug Laboratory Locations

VERSION DATE: 07/01/16

The U.S. Department of Justice ("the Department") provides this information as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments. The Department does not establish, implement, enforce, or certify compliance with clean-up or remediation standards for contaminated sites; the public should contact a state or local health department or environmental protection agency for that information.

DOCKETS EPA Docket Data

VERSION DATE: 12/22/05

The United States Environmental Protection Agency Docket data lists Civil Case Defendants, filing dates as far back as 1971, laws broken including section, violations that occurred, pollutants involved, penalties assessed and superfund awards by facility and location. Please refer to ICIS database as source of current data.

EC Federal Engineering Institutional Control Sites

VERSION DATE: 08/03/15

This database includes site locations where Engineering and/or Institutional Controls have been identified as part

of a selected remedy for the site as defined by United States Environmental Protection Agency official remedy decision documents. A site listing does not indicate that the institutional and engineering controls are currently in place nor will be in place once the remedy is complete; it only indicates that the decision to include either of them in the remedy is documented as of the completed date of the document. Institutional controls are actions, such as legal controls, that help minimize the potential for human exposure to contamination by ensuring appropriate land or resource use. Engineering controls include caps, barriers, or other device engineering to prevent access, exposure, or continued migration of contamination.

ECHOR08 Enforcement and Compliance History Information

VERSION DATE: 08/26/17

The EPA's Enforcement and Compliance History Online (ECHO) database, provides compliance and enforcement information for facilities nationwide. This database includes facilities regulated as Clean Air Act stationary sources, Clean Water Act direct dischargers, Resource Conservation and Recovery Act hazardous waste handlers, Safe Drinking Water Act public water systems along with other data, such as Toxics Release Inventory releases.

ERNSUT Emergency Response Notification System

VERSION DATE: 10/15/17

This National Response Center database contains data on reported releases of oil, chemical, radiological, biological, and/or etiological discharges into the environment anywhere in the United States and its territories. The data comes from spill reports made to the U.S. Environmental Protection Agency, U.S. Coast Guard, the National Response Center and/or the U.S. Department of Transportation.

FRSUT Facility Registry System

VERSION DATE: 09/06/17

The United States Environmental Protection Agency's Office of Environmental Information (OEI) developed the Facility Registry System (FRS) as the centrally managed database that identifies facilities, sites or places subject to environmental regulations or of environmental interest. The Facility Registry System replaced the Facility Index System or FINDS database.

HMIRSR08 Hazardous Materials Incident Reporting System

VERSION DATE: 08/30/17

The HMIRS database contains unintentional hazardous materials release information reported to the U.S. Department of Transportation located in EPA Region 8. This region includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

ICIS Integrated Compliance Information System (formerly DOCKETS)

VERSION DATE: 09/23/17

ICIS is a case activity tracking and management system for civil, judicial, and administrative federal Environmental Protection Agency enforcement cases. ICIS contains information on federal administrative and federal judicial cases under the following environmental statutes: the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act, the Emergency Planning and Community Right-to-Know Act - Section 313, the Toxic Substances Control Act, the Federal Insecticide, Fungicide, and Rodenticide Act, the Comprehensive Environmental Response, Compensation, and Liability Act, the Safe Drinking Water Act, and the Marine Protection, Research, and Sanctuaries Act.

ICISNPDES Integrated Compliance Information System National Pollutant Discharge Elimination System

VERSION DATE: 07/09/17

Authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

LUCIS Land Use Control Information System

VERSION DATE: 09/01/06

The LUCIS database is maintained by the U.S. Department of the Navy and contains information for former Base Realignment and Closure (BRAC) properties across the United States.

MLTS Material Licensing Tracking System

VERSION DATE: 06/29/17

MLTS is a list of approximately 8,100 sites which have or use radioactive materials subject to the United States Nuclear Regulatory Commission (NRC) licensing requirements.

NPDESR08 National Pollutant Discharge Elimination System

VERSION DATE: 04/01/07

Authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The NPDES database was collected from December 2002 until April 2007. Refer to the PCS and/or ICIS-NPDES database as source of current data. This database includes permitted facilities located in EPA Region 8. This region includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

PADS PCB Activity Database System

VERSION DATE: 07/18/17

PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

PCSR08 Permit Compliance System

VERSION DATE: 08/01/12

The Permit Compliance System is used in tracking enforcement status and permit compliance of facilities controlled by the National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act and is maintained by the United States Environmental Protection Agency's Office of Compliance. PCS is designed to support the NPDES program at the state, regional, and national levels. This database includes permitted facilities located in EPA Region 8. This region includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming. PCS has been modernized, and no longer exists. National Pollutant Discharge Elimination System (ICIS-NPDES) data can now be found in Integrated Compliance Information System (ICIS).

RCRASC RCRA Sites with Controls

VERSION DATE: 03/08/16

The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities with institutional controls in place.

SEMSLIENS SEMS Lien on Property

VERSION DATE: 07/11/17

The U.S. Environmental Protections Agency's (EPA) Office of Solid Waste and Emergency Response, Office of Superfund Remediation and Technology Innovation (OSRTI), has implemented The Superfund Enterprise Management System (SEMS), formerly known as CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) to track and report on clean-up and enforcement activities taking place at Superfund sites. SEMS represents a joint development and ongoing collaboration between Superfund's Remedial, Removal, Federal Facilities, Enforcement and Emergency Response programs. This is a listing of SEMS sites with a lien on the property.

SFLIENS CERCLIS Liens

VERSION DATE: 06/08/12

A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which United States Environmental Protection Agency has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties. This database contains those CERCLIS sites where the Lien on Property action is complete.

SSTS Section Seven Tracking System

VERSION DATE: 12/08/14

The United States Environmental Protection Agency tracks information on pesticide establishments through the Section Seven Tracking System (SSTS). SSTS records the registration of new establishments and records pesticide production at each establishment. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) requires that production of pesticides or devices be conducted in a registered pesticide-producing or device-producing establishment. ("Production" includes formulation, packaging, repackaging, and relabeling.)

TRI Toxics Release Inventory

VERSION DATE: 12/31/15

The Toxics Release Inventory, provided by the United States Environmental Protection Agency, includes data on toxic chemical releases and waste management activities from certain industries as well as federal and tribal facilities. This inventory contains information about the types and amounts of toxic chemicals that are released each year to the air, water, and land as well as information on the quantities of toxic chemicals sent to other facilities for further waste management.

TSCA Toxic Substance Control Act Inventory

VERSION DATE: 12/31/12

The Toxic Substances Control Act (TSCA) was enacted in 1976 to ensure that chemicals manufactured, imported, processed, or distributed in commerce, or used or disposed of in the United States do not pose any unreasonable risks to human health or the environment. TSCA section 8(b) provides the United States Environmental Protection Agency authority to "compile, keep current, and publish a list of each chemical substance that is manufactured or processed in the United States." This TSCA Chemical Substance Inventory contains non-confidential information on the production amount of toxic chemicals from each manufacturer and importer site.

RCRAGR08 Resource Conservation & Recovery Act - Generator

VERSION DATE: 10/17/17

The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities currently generating hazardous waste. EPA Region 8 includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

RCRANGR08 Resource Conservation & Recovery Act - Non-Generator

VERSION DATE: 10/17/17

The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities classified as non-generators. Non-Generators do not presently generate hazardous waste. EPA Region 8 includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

ALTFUELS Alternative Fueling Stations

VERSION DATE: 05/16/17

Nationwide list of alternative fueling stations made available by the US Department of Energy's Office of Energy Efficiency & Renewable Energy. Includes Biodiesel stations, Ethanol (E85) stations, Liquefied Petroleum Gas (Propane) stations, Ethanol (E85) stations, Natural Gas stations, Hydrogen stations, and Electric Vehicle Supply Equipment (EVSE).

FEMAUST FEMA Owned Storage Tanks

VERSION DATE: 12/01/16

This is a listing of FEMA owned underground and aboveground storage tank sites. For security reasons, address information is not released to the public according to the U.S. Department of Homeland Security.

HISTPST Historical Gas Stations

VERSION DATE: NR

This historic directory of service stations is provided by the Cities Service Company. The directory includes Cities Service filling stations that were located throughout the United States in 1930.

ICISCLEANERS Integrated Compliance Information System Drycleaners

VERSION DATE: 09/23/17

This is a listing of drycleaner facilities from the Integrated Compliance Information System (ICIS). The Environmental Protection Agency (EPA) tracks facilities that possess NAIC and SIC codes that classify businesses as drycleaner establishments.

MRDS Mineral Resource Data System

VERSION DATE: 03/15/16

MRDS (Mineral Resource Data System) is a collection of reports describing metallic and nonmetallic mineral resources throughout the world. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. This database contains the records previously provided in the Mineral Resource Data System (MRDS) of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS.

MSHA Mine Safety and Health Administration Master Index File

VERSION DATE: 09/01/17

The Mine dataset lists all Coal and Metal/Non-Metal mines under MSHA's jurisdiction since 1/1/1970. It includes such information as the current status of each mine (Active, Abandoned, NonProducing, etc.), the current owner and operating company, commodity codes and physical attributes of the mine. Mine ID is the unique key for this data. This information is provided by the United States Department of Labor - Mine Safety and Health Administration (MSHA).

BF Brownfields Management System

VERSION DATE: 08/17/17

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. The United States Environmental Protection Agency maintains this database to track activities in the various brown field grant programs including grantee assessment, site cleanup and site redevelopment. This database included tribal brownfield sites.

DNPL Delisted National Priorities List

VERSION DATE: 10/10/17

This database includes sites from the United States Environmental Protection Agency's Final National Priorities List (NPL) where remedies have proven to be satisfactory or sites where the original analyses were inaccurate, and the site is no longer appropriate for inclusion on the NPL, and final publication in the Federal Register has occurred.

NLRRCRAT No Longer Regulated RCRA Non-CORRACTS TSD Facilities

VERSION DATE: 10/17/17

This database includes RCRA Non-Corrective Action TSD facilities that are no longer regulated by the United States Environmental Protection Agency or do not meet other RCRA reporting requirements. This listing includes facilities that formerly treated, stored or disposed of hazardous waste.

ODI Open Dump Inventory

VERSION DATE: 06/01/85

The open dump inventory was published by the United States Environmental Protection Agency. An “open dump” is defined as a facility or site where solid waste is disposed of which is not a sanitary landfill which meets the criteria promulgated under section 4004 of the Solid Waste Disposal Act (42 U.S.C. 6944) and which is not a facility for disposal of hazardous waste. This inventory has not been updated since June 1985.

RCRAT Resource Conservation & Recovery Act - Non-CORRACTS Treatment, Storage & Disposal Facilities

VERSION DATE: 10/17/17

The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities recognized as hazardous waste treatment, storage, and disposal sites (TSD).

SEMS Superfund Enterprise Management System

VERSION DATE: 10/10/17

The U.S. Environmental Protections Agency's (EPA) Office of Solid Waste and Emergency Response, Office of Superfund Remediation and Technology Innovation (OSRTI), has implemented The Superfund Enterprise Management System (SEMS), formerly known as CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) to track and report on clean-up and enforcement activities taking place at Superfund sites. SEMS represents a joint development and ongoing collaboration between Superfund's Remedial, Removal, Federal Facilities, Enforcement and Emergency Response programs.

SEMSARCH Superfund Enterprise Management System Archived Site Inventory

VERSION DATE: 10/10/17

The Superfund Enterprise Management System Archive listing (SEMS-ARCHIVE) has replaced the CERCLIS NFRAP reporting system in 2015. This listing reflect sites that have been assessed and no further remediation is planned and is of no further interest under the Superfund program.

SMCRA Surface Mining Control and Reclamation Act Sites

VERSION DATE: 08/25/17

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

USUMTRCA Uranium Mill Tailings Radiation Control Act Sites

VERSION DATE: 03/04/17

The Legacy Management Office of the Department of Energy (DOE) manages radioactive and chemical waste, environmental contamination, and hazardous material at over 100 sites across the U.S. The L.M. Office manages this database of sites registered under the Uranium Mill Tailings Control Act (UMTRCA).

DOD Department of Defense Sites

VERSION DATE: 06/21/10

This information originates from the National Atlas of the United States Federal Lands data, which includes lands owned or administered by the Federal government. Army DOD, Army Corps of Engineers DOD, Air Force DOD, Navy DOD and Marine DOD areas of 640 acres or more are included.

FUDS Formerly Used Defense Sites

VERSION DATE: 06/01/15

The Formerly Used Defense Sites (FUDS) inventory includes properties previously owned by or leased to the United States and under Secretary of Defense Jurisdiction, as well as Munitions Response Areas (MRAs). The remediation of these properties is the responsibility of the Department of Defense. This data is provided by the U.S. Army Corps of Engineers (USACE), the boundaries/polygon data are based on preliminary findings and not all properties currently have polygon data available. DISCLAIMER: This data represents the results of data collection/processing for a specific USACE activity and is in no way to be considered comprehensive or to be used in any legal or official capacity as presented on this site. While the USACE has made a reasonable effort to insure the accuracy of the maps and associated data, it should be explicitly noted that USACE makes no warranty, representation or guaranty, either expressed or implied, as to the content, sequence, accuracy, timeliness or completeness of any of the data provided herein. For additional information on Formerly Used Defense Sites please contact the USACE Public Affairs Office at (202) 528-4285.

FUSRAP Formerly Utilized Sites Remedial Action Program

VERSION DATE: 03/04/17

The U.S. DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from the Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations. The DOE Office of Legacy Management (LM) established long-term surveillance and maintenance (LTS&M) requirements for remediated FUSRAP sites. DOE evaluates the final site conditions of a remediated site on the basis of risk for different future uses. DOE then confirms that LTS&M requirements will maintain protectiveness.

NLRRCRAC No Longer Regulated RCRA Corrective Action Facilities

VERSION DATE: 10/17/17

This database includes RCRA Corrective Action facilities that are no longer regulated by the United States Environmental Protection Agency or do not meet other RCRA reporting requirements.

NMS Former Military Nike Missile Sites

VERSION DATE: 12/01/84

This information was taken from report DRXTH-AS-IA-83A016 (Historical Overview of the Nike Missile System, 12/1984) which was performed by Environmental Science and Engineering, Inc. for the U.S. Army Toxic and Hazardous Materials Agency Assessment Division. The Nike system was deployed between 1954 and the mid-1970's. Among the substances used or stored on Nike sites were liquid missile fuel (JP-4); starter fluids (UDKH, aniline, and furfuryl alcohol); oxidizer (IRFNA); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil); solvents (carbon tetrachloride, trichloroethylene, trichloroethane, stoddard solvent); and battery electrolyte. The quantities of material a disposed of and procedures for disposal are not documented in published reports. Virtually all information concerning the potential for contamination at Nike sites is confined to personnel who were assigned to Nike sites.
During deactivation most hardware was shipped to depot-level supply points. There were reportedly instances where excess materials were disposed of on or near the site itself at closure. There was reportedly no routine site decontamination.

NPL National Priorities List

VERSION DATE: 10/10/17

This database includes United States Environmental Protection Agency (EPA) National Priorities List sites that fall under the EPA's Superfund program, established to fund the cleanup of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action.

PNPL Proposed National Priorities List

VERSION DATE: 10/10/17

This database contains sites proposed to be included on the National Priorities List (NPL) in the Federal Register. The United States Environmental Protection Agency investigates these sites to determine if they may present long-term threats to public health or the environment.

RCRAC Resource Conservation & Recovery Act - Corrective Action Facilities

VERSION DATE: 10/17/17

The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities with corrective action activity.

RCRASUBC Resource Conservation & Recovery Act - Subject to Corrective Action Facilities

VERSION DATE: 10/17/17

The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities subject to corrective actions.

RODS Record of Decision System

VERSION DATE: 01/23/12

These decision documents maintained by the United States Environmental Protection Agency describe the chosen remedy for NPL (Superfund) site remediation. They also include site history, site description, site characteristics, community participation, enforcement activities, past and present activities, contaminated media, the contaminants present, and scope and role of response action.

ICEC Institutional Engineering Controls Registry

VERSION DATE: 10/15/17

The Utah Department of Environmental Quality is required to maintain a record of the properties subject to environmental covenants/institutional controls established under Utah Code, Title 19, Chapter 10. This list Leaking Underground Storage Tank sites, CERCLA/Superfund Branch Sites, and Voluntary Cleanup sites that have environmental controls established under this statute and pursuant to Utah Code Ann. §§ 57-25-101 et seq and controls established prior to the enactment of this statute. The controls have been recorded by the owner of the real property in the county recorder's office in the county where the real property is located.

SLCCDL Salt Lake County Clandestine Drug Laboratory

VERSION DATE: 10/04/17

The purpose of this regulation is to protect the public's health, safety, and welfare by establishing standards, procedures, and responsibilities for the regulation of the occupancy and use of property where hazardous or dangerous chemicals or chemical residues commonly associated with the manufacture of illegal drugs or other hazardous or dangerous chemicals are or may be present; the regulation of the decontamination of such contaminated properties; and the regulation of the disposal of hazardous or dangerous materials and contaminated debris removed from contaminated properties.

TIERII Tier II Facilities

VERSION DATE: 09/18/17

This database contains locations of Tier II facilities under the Emergency Planning and Community Right-to-Know Act (EPCRA). This data is maintained by the Utah Department of Environmental Quality's Division of Environmental Response and Remediation (DERR). The DERR assumes no responsibility or liability for the accuracy of the location of these facilities. This database also includes some Tier II facility information from the Utah Automated Geographic Reference Center (AGRC) for informational purposes. Qualifying facilities report on hazardous and toxic chemicals and are labeled either tier I or tier II. Locations are based on coordinates derived from maps and GPS data. These locations represent sites, not contaminated areas.

RUST Registered Underground Storage Tanks

VERSION DATE: 09/05/17

The Utah State Underground Storage Tank program of the Department of Environmental Quality provides this list of underground storage tank sites.

BF Brownfield Properties

VERSION DATE: 09/05/17

This database of brownfields (targeted) and other brownfield (non-targeted) properties is maintained by the Utah Department of Environmental Quality's Division of Environmental Response and Remediation (DERR).

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped open land, and both improves and protects the environment. The DERR assumes no responsibility or liability for the accuracy of the location of these properties.

CERCLIS CERCLIS Sites

VERSION DATE: 10/18/17

This database of Comprehensive Environmental Response, Compensation, and Liability System sites is maintained by the Utah Department of Environmental Quality's Division of Environmental Response and Remediation (DERR). The CERCLA Branch of the DERR performs site investigations of potentially contaminated sites within the State of Utah to determine whether or not they pose a threat to human health and the environment and should be included on the Federal Superfund National Priorities List. The DERR assumes no responsibility or liability for the accuracy of the location of these properties.

LFSWDS Landfill and Solid Waste Disposal Sites

VERSION DATE: 10/09/17

This list of permitted solid waste facilities is provided by the Utah Department of Environmental Quality.

LUST Leaking Underground Storage Tanks

VERSION DATE: 09/07/17

The Utah State Underground Storage Tank program of the Department of Environmental Quality provides this list of leaking underground storage tank sites. The primary goal of this program is to protect human health and the environment from leaking underground storage tanks. The UST staff oversees UST notification, installation, inspection, removal, and compliance with State and Federal UST regulations concerning release prevention and remediation.

VCP Voluntary Cleanup Program Sites

VERSION DATE: 10/25/17

This list of Voluntary Cleanup Program sites is maintained by the Utah Department of Environmental Quality's Division of Environmental Response and Remediation (DERR). The DERR assumes no responsibility or liability for the accuracy of the location of these facilities. In 1997, the Utah Voluntary Cleanup Program (VCP) was created to promote the voluntary cleanup of contaminated sites. The VCP is intended to encourage redevelopment of Brownfields and other impacted sites by providing a streamlined cleanup program. This database also includes some Voluntary Cleanup information from the Utah Automated Geographic Reference Center (AGRC) for informational purposes. Locations are based on coordinates derived from maps and GPS data.

NPL National Priorities List

VERSION DATE: 10/20/17

The National Priorities List (NPL) is provided by the Utah Department of Environmental Quality's Division of Environmental Response and Remediation (DERR). Before a cleanup of a hazardous waste site can take place under Superfund, it must be included on the National Priority List. The NPL is a published list of hazardous waste sites that are eligible for extensive, long-term cleanup action under the Superfund program. When no responsible party can be found, listing on the NPL allows EPA and the State to access the Superfund Trust fund to pay for site cleanup. The DERR assumes no responsibility or liability for the accuracy of the location of these properties.

Environmental Records Definitions - TRIBAL

USTR08 Underground Storage Tanks On Tribal Lands

VERSION DATE: 05/01/17

This database, provided by the United States Environmental Protection Agency (EPA), contains underground storage tanks on Tribal lands located in EPA Region 8. This region includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

LUSTR08 Leaking Underground Storage Tanks On Tribal Lands

VERSION DATE: 05/01/17

This database, provided by the United States Environmental Protection Agency (EPA), contains leaking underground storage tanks on Tribal lands located in EPA Region 8. This region includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

ODINDIAN Open Dump Inventory on Tribal Lands

VERSION DATE: 11/08/06

This Indian Health Service database contains information about facilities and sites on tribal lands where solid waste is disposed of, which are not sanitary landfills or hazardous waste disposal facilities, and which meet the criteria promulgated under section 4004 of the Solid Waste Disposal Act (42 U.S.C. 6944).

INDIANRES Indian Reservations

VERSION DATE: 01/01/00

The Department of Interior and Bureau of Indian Affairs maintains this database that includes American Indian Reservations, off-reservation trust lands, public domain allotments, Alaska Native Regional Corporations and Recognized State Reservations.

SQG/CESQG
COMPLIANCE EVALUATION INSPECTION

2014-011987

Date of Inspection:	August 27, 2014
Facility:	Schovaers Electronics Corp.
Facility Address:	22 Jeremy Street, Salt Lake City Utah 84104
County:	Salt Lake
EPA ID #	UTD085325769
Latitude / Longitude:	40.768652-111.915774
Generator Status:	SQG
Number of Employees:	5
Arrival / Departure Time:	11:30 a.m. to 12:30 p.m.
Weather Conditions:	Sunny, 70°F
Report Prepared By:	
Names of Inspectors:	Alex Pashley
Local Health Department Notification:	Salt Lake County Health Department, Notified was by e-mail on August 26, 2014.
Facility Notification / Date:	Unannounced
Applicable Rules:	**R315:** R315-5, R315-13, R315-16 and R315-9 of the Utah Administrative Code

CREDENTIALS

On August 27, 2014 the inspection team (team) met with and presented credentials to Bob Schovaers.

PURPOSE AND SCOPE

The purpose of this Compliance Evaluation Inspection (CEI) was to evaluate the Facility's waste management practices for compliance with R315 of the Utah Administrative Code (the Rules), Utah Solid and Hazardous Waste Act 19-6-101.

FACILITY DESCRIPTION AND WASTE MANAGEMENT OPERATIONS

Schovaers Electronics Corp. (Schovaers) is a circuit board plater and manufacture. Schovaers generates about 166 lbs. of waste water treatment filter press sludge cake (FOO6) per month, which is CESQG amounts. The filter press cake contains some lead (D008). Schovaers tries to completely fill a marino bag, before it is sent off for disposal, because it costs $300 dollars whether the marino bag is full or not. The problem is that a full marino bag of filter press sludge may weight more than the allowed 2,200lbs allowed under the CESQG rules, therefore Schovaers has decided to stay in the SQG category. Before placing the filter press cake into the marino bag, it is accumulated in 55-gallon drums. The drums were properly labeled and closed, however one of the drums was in very poor condition and had a corrosion hole in it (see pic). The filter press cake was dried, and was not leaking from the drum. Mr. Schovaer was told that all four drums needed to be replaced immediately. He indicated that he had four poly drums in back that he would start using.

All SQG required records and plans were in place and in good order. No problems were noted.

COMPLIANCE STATUS:

R315-5	**Hazardous Waste Generator Requirements**	
5-1.11	Determination of Whether a Waste is a Hazardous Waste	OK
5-1.12	EPA Identification Numbers UTD085325769	
5-2.20	Manifest OK	
5-3.30-3.33	Packaging, Labeling, Marking, and Placarding OK	
5.3.34	Accumulation Time OK	
	Container Management OK	
	Tank Management OK	
	Preparedness and Prevention OK	
5-4.40	Recordkeeping OK	
5-4.41	Biennial Reporting OK	

5-4.42 Exception Reporting N/A

5-4.43.1 Additional Reporting N/A

R315-13-1 Land Disposal Restrictions

13-1 Land Disposal Restrictions OK

R315-16 Standards for Universal Waste

R315-9 Spill Response

FOLLOW-UP ACTIONS:

Inspector Signature: Alf Pashley September 2, 2014
Date

ATTACHMENTS:

1. Photos
2. SQG Checklist

SQG Evaluation Form

Utah Department of Environmental Quality
Division of Solid and Hazardous Waste
P.O. Box 144880
Salt Lake City, Utah 84114-4880
Phone (801) 536-0200
Fax (801) 536-0222

SMALL BUSINESS ASSISTANCE PROGRAM
FACILITY INFORMATION FORM

Facility Name: Schovaers Electronics Corp		**EPA ID Number:** UTD085325769	
Street Address: 22 Jeremy Street		**City:** Salt Lake	**Zip:** 84104
County: SL	**Contact Person:** Bob Schovers	**Telephone #:** 801-521-2668	
Generator Status: SQG	**Number of Employees:** 5	**Date of Visit:** 8-27-2014	
Evaluators: Alex Pashley			
Other Personnel:			

Waste Stream/Generation Process	Estimated Generation Rate Per Month	Hazardous Waste Code
Plating Filter Cake.	166lbs/month.	F006 D008
Estimated Quantity of Hazardous Waste Generated Per Month		

Date: 8-27-2014

RECEIVED BY:
Name: (Printed) BOB SCHOVAERS
Signature: Bob Schovaers
Title: PRESIDENT

DSHW REPRESENTATIVE:
Name: (Printed) Alex Pashley
Signature: Alex Pashley
Title:

notified as a SQG but only generate CESQG amounts.

APPENDIX E
CREDENTIALS

CHRISTINA CHENEY
ESA GROUP MANAGER

PROFESSIONAL EXPERIENCE
Ms. Cheney joined Neil O. Anderson and Associates, a Terracon Company, in 2004. In 2014 she began working for Terracon's Salt Lake City office. Working under the guidance of Terracon's professional engineering staff, which includes geotechnical engineers, geologists, and geoscientists, she quickly gained extensive experience in environmental site investigations and remediations.

Her specific expertise includes environmental site assessments; surface and groundwater contamination assessments, prevention, monitoring and control; risk assessments and risk reduction recommendations; soil contamination assessments, and the prevention, monitoring and control; and other areas of expertise relating to hazardous substances and/or hazardous waste management.

Ms. Cheney has 12 years of experience performing Phase I Environmental Site Assessments (ESAs). She has conducted over 200 studies, including auto shops/gasoline stations, residential properties, dairies, industrial properties, and agricultural properties. These studies have been conducted in Utah, Idaho, Colorado, and California and have followed ASTM Standard E1527-13 and EPA's All Appropriate Inquiry Standard. Phase I ESA report completion is often needed to complete the sale of commercial property. For less suspect properties, she has performed and managed the Transaction Screen Process, ASTM Standard E1528-14, and Regulatory Database Reviews, understanding the limits of those studies recommendations were sometimes needed to transition to a Phase I ESA when Potential Environmental Conditions should be more fully researched, evaluated and discussed.

PROJECT EXPERIENCE
Cobalt Phase I ESAs - Salt Lake City, Utah
Ms. Cheney served as an assistant for several concurrent Phase I ESAs for several industrial properties in the Salt Lake Valley. Reviewed historical and county records, federal, state, and local agency databases, conducted interviews, and also coauthored the report. Recognized environmental conditions were identified and, a Phase II ESA was recommended on several sites.

Sears Phase I ESAs - California and Utah
Ms. Cheney served as Project Manager for several concurrent Phase I ESAs for several Sears' stores in both California and Utah. Reviewed historical and county records, federal, state, and local agency databases, conducted interviews, and also coauthored the reports. Recognized environmental conditions were identified and, a Phase II ESA was recommended on several sites.

Ensign Group, Senior Care Facilities - Various Locations
Ms. Cheney served as Project Manager for several concurrent Phase I ESAs for senior-care facilities in Utah. She reviewed historical and county records, federal, state, and local agency databases, conducted interviews, and the reports.

Royal Woods Plaza - Salt Lake City, Utah
Ms. Cheney served as Project Manager for this project. She reviewed historical and county records, federal, state, and local agency databases, conducted

EDUCATION
Brigham Young University, Bachelors of Science in Recreation Management & Leisure Services, 2002

Ricks College, Associates of Science in Electronics Engineering Technology, 1999

Ricks College, Associates of Science in Computer Systems Technology, 1999

CERTIFICATIONS
Registered Environmental Assessor #30103 (2008-2012)

AHERA: Building Inspector

WORK HISTORY
Terracon Consultants, Inc., ESA Group Manager, 2016-Present

Terracon Consultants, Inc., Staff Environmental Scientist, 2014-2016

Neil O. Anderson & Associates, Staff Environmental Scientist, 2004-2014

interviews, and also authored the report. She identified a former gas station at the site. Recognized environmental conditions were identified and a Phase II ESA was recommended.

Parkway Commons - Murray Utah, Utah
Ms. Cheney served as Project Manager for the Phase I ESAs and limited sampling. Sampling included radon, lead in water, and asbestos. She reviewed historical and county records, federal, state, and local agency databases, conducted interviews, and authored the report.

Wells Fargo Bank - Various Locations
Ms. Cheney served as Project Manager for several Phase I ESAs throughout Utah for Wells Fargo Bank. Visual and limited sampling for asbestos was included for some of the reports. She reviewed historical and county records, federal, state, and local agency databases, conducted interviews, and authored the reports.

The Church of Jesus Christ of Latter-day Saints - Various Locations
Ms. Cheney served as Project Manager for several Phase I ESAs throughout Utah for the Church of Jesus Christ of Latter-day Saints. She reviewed historical and county records, federal, state, and local agency databases, conducted interviews, and authored the reports.

Cosumnes River College - Sacramento, California
CEQA Initial Study – Provided environmental assessment for the construction of a new athletic field complex at Cosumnes River College Campus for the Los Rios Community College School District. Neil O. Anderson & Associates acted as the premier agent in performing Initial Study – Mitigated Negative Declarations for the site.

Elk Grove Satellite Campus - Elk Grove, California
CEQA Initial Study - Provided environmental assessment for the construction of new athletic field complex at Elk Grove Campus for the Los Rios Community College School District. Neil O. Anderson & Associates acted as the premier agent in performing both Initial Study – Mitigated Negative Declarations and Traffic Studies for the site.

Madera High School - Madera, California
Provided environmental assessment for the construction of a new high school in Madera. Neil O. Anderson & Associates acted as the premier agent in performing the Initial Study, Preliminary Environmental Assessment (PEA) Removal Action (RA) Reports for the site. Ms. Cheney reviewed the Initial Study and worked with the Project Manager on the write-up of the PEA Workplan, PEA, RA Workplan, and RA reports.

Chinchiolo Stemilt Groundwater Monitoring - Stockton, California
Ms. Cheney served as a staff scientist on this project, which involved quarterly and annual monitoring to the Central Valley Regional Water Quality Control Board. Responsibilities included creating groundwater contour maps from groundwater data collected from on-site monitoring wells, calculating the flow direction and hydraulic gradient of groundwater at the subject property, analyzing and interpreting analytical data, and compiling the quarterly and annual reports.

Grupe Real Estate Phase I ESAs - Alamo, Martinez, Lafayette, El Dorado Hills, California
Ms. Cheney served as Project Manager for four concurrent Phase I ESAs for proposed residential developments in Contra Costa County and El Dorado County. Reviewed historical and county records, federal, state, and local agency databases, conducted interviews, and also coauthored the report. Recognized environmental conditions, including possible lead-based paint, asbestos, and pesticides, were identified on one subject property; a Phase II ESA was recommended.

Benjamin B. Bowers

ENVIRONMENTAL DEPARTMENT MANAGER

EDUCATION
Bachelor of Science, Environmental Policy, St. Norbert College, 1998

CERTIFICATIONS
40-Hour OSHA Hazardous Wastes Operations Training, Utah (2000)

State of Utah UST Certified Consultant, Utah CC 195

Certified UST Groundwater and Soil Sampler, Utah GS-1419

Nuclear Density Gauge Safety Training (1998)

AFFILIATIONS
Utah Alliance For Economic Development

WORK HISTORY
Terracon Consultants, Inc. Environmental Dept. Manager, 2006 –Present; Project Manager, 2004 – 2006; Staff Scientist, 2003-2004

PSI, Inc. , Environmental Project Manager, 2002-2003

Giles Engineering Assoc., Inc., Staff Scientist, 1999-2002; CMT Field Technician, 1998-1999

PROFESSIONAL EXPERIENCE

Mr. Bowers is the Environmental Department Manager in Terracon's Salt Lake City office. He has more than 18 years of valuable and proactive experience in the environmental, construction materials and geotechnical consulting fields. His experience includes Phase I, II, and III environmental site assessments (ESAs), National Environmental Policy Act (NEPA), Brownfields, subsurface investigations, remediation, asbestos inspections, construction materials testing, and geotechnical engineering. His expertise complements projects that require multiple consulting services and enhances the sharing of information and understanding between the environmental, construction materials, and geotechnical disciplines. Mr. Bowers is responsible for the management and overview of over 100 environmental site assessments a year and has participated in more than 1,000 Phase I, Phase II, and remediation projects. Over his 18-year career, Mr. Bowers has personally completed hundreds of Phase I ESAs on a variety of sites, ranging from retail, industrial, residential, agricultural and undeveloped.

Mr. Bowers has acted as project manager for numerous site investigations and remediation projects for petroleum distributors, Brownfield projects, municipalities, and commercial and industrial property owners. He has developed remedial action plans based upon the property owners' objective and hydrogeological conditions. Remedial actions included soil excavation, mechanical soil and groundwater treatment systems, in-situ bioremediation, oxidization, and natural attenuation.

PROJECT EXPERIENCE

PHASE I ENVIRONMENTAL SITE ASSESSMENTS

Norbest Foods – Various Sites, Utah
Managed the completion of Phase I ESAs on 13 individual properties as part of a commercial refinancing portfolio for the property owner. The subject sites varied from vacant land, gasoline/service stations, food-processing facilities, and turkey farms. During the ESA process, numerous RECs were identified associated with leaking aboveground and underground storage tanks, oil spills originating from automotive maintenance on the sites and compressor blow-down. Mr. Bowers managed site soil remediation at three of the 13 sites and achieved no further action status for the releases.

FDIC – Various Sites – Utah
Served as technical reviewer for over 40 Phase I ESAs and Phase IIs. Sites included retail, office, commercial, industrial, proposed residential developments, and vacant properties.

In-N-Out Burgers – Various Sites, Utah, Nevada, California and Texas
As the National Account Manager for In-N-Out Burgers located in California, Mr. Bowers has managed the completion of over 100 Phase I ESAs, Limited Site Investigations, and geotechnical investigations in six western US states.

TELECOMMUNICATIONS

Over 900 Towers for Telecommunication Firms – Utah, Idaho and Wyoming
Managed the completion of Phase I ESAs, Section 106 and NEPA work for more than 800 cell tower sites for various cellular companies throughout the states of Utah, Idaho, and Wyoming. Clients include AT&T, Verizon Wireless, T-Mobile, Cricket, Sprint, and other telecommunication service companies, such as General Dynamics, Clearwire, Pacific Telecom Service, Overland, and Black & Veatch Company among others.

UST/LUST

Former Roadway Express Facility – Salt Lake City, Utah
Project Manager for the investigation and remediation of the site after a failing leak detection test was reported on a new oil product line that serviced three fuel islands at the trucking terminal. During the investigation, new motor oil was detected above regulatory limits in the soil and groundwater on the site. Terracon prepared an Underground Storage Tank (UST) closure plan and closure notice before abandoning the oil product lines in-place. Soil sampling indicated widespread oil and diesel contamination along the product lines and dispensers. Mr. Bowers prepared a Corrective Action Plan (CAP) to excavate the petroleum-impacted soils. Approximately 720 tons of impacted soils were removed and disposed at a licensed facility. Terracon implemented a quarterly groundwater sampling program and was able to remediate soil and groundwater below regulatory limits and received no further action for the site release.

At the same site, Mr. Bowers managed a Limited Site Investigation in the area of the on-site maintenance building and diesel tank farm that serviced the site and identified oil and diesel constituents above regulatory limits in the soil and groundwater. Terracon developed and completed a pilot test to determine the feasibility of full-scale anaerobic bioremediation using an oil digestant, BioRem 2000®. The pilot test included physical contaminant removal using vacuum-enhanced fluid recovery (VEFR) to remove vapor and dissolved and free-phase volatile organic compounds (VOCs) from the subsurface. Approximately 16,000-gallons of petroleum-impacted water was removed, treated on site with an air sparging system, and discharged under a one-time UPDES permit. Following the VEFR event, Terracon conducted injection events into 44 monitoring / injection wells for a total of three nutrient injections and two BioRem injections over a five-week period. TPH-DRO concentrations were reduced by 54% during the 35 day pilot test. Following the successful completion of the pilot test, Terracon was approved by the State to conduct full-scale remediation at the site. Upon approval from the state, approximately 280 tons of impacted soils were removed from the areas near dispensers. Free product (diesel) was discovered in several monitoring area surrounding the diesel tank farm. Injections were conducted on the site for approximately three years, after which Terracon was able to achieve no further action status for the release.

9th Street Marketplace Shopping Center – Former San Marcos Property, Murray, Utah
The site was a former corner gasoline service station that was abandoned in the late 1960s. A local developer purchased the property with plans to develop the site within 180 days. Terracon conducted a Limited Site Investigation and it was determined that the soil and groundwater at the site were impacted with gasoline, used oil, and diesel constituents above Initial Screening Levels. In addition, trichloroethene (TCE) was detected above EPA National Primary Drinking Water Standards in a groundwater monitoring well on the perimeter of the site. It was later determined that the TCE had migrated on to the site from a nearby dry cleaners. Terracon met with members of the Division of Solid and Hazardous Waste to discuss the chlorinated solvents in the groundwater, and devised a remediation plan to address the impacted soils and groundwater on the site. There was additional collaboration with the Division of Environmental Response and Remediation (DERR) on this remediation approach due to the petroleum hydrocarbons impacts and former USTs on the site. Due to the short time-frame for development, Terracon used a "dig and haul" approach to remediate the site. Approximately 1,150 tons of petroleum-impacted soils were excavated and disposed at ET Technologies Soil Regeneration site for land farming. Upon completion of remediation services, the site received a No Further Action letter from the DERR for the Leaking Underground Storage Tank (LUST) release. The DSHW provided a letter indicating that the TCE contamination appeared to be from an off-site source and no additional sampling was necessary.

Tesoro #40 – South Salt Lake, Utah
A release was discovered following the closure of three USTs in April 2008. Terracon is providing ongoing services for site characterization, vapor intrusion evaluation, groundwater monitoring and remediation. Using a phased site investigation approach, Terracon defined the vertical and lateral extent of impact to subsurface soils and groundwater. The site investigation determined that constituent concentrations exceeding applicable action levels (Tier 1 Screening Levels and Initial Screening Levels) extend from the source area down gradient to adjacent off-site properties. Of particular concern is an adjacent residential apartment building (down gradient from the source area) where elevated gasoline constituent concentrations are present in underlying soils and groundwater. To assess vapor intrusion (VI) potential, Terracon worked closely with DERR representatives (who are using this site as a VI case study) to conduct quarterly rounds of sub-slab soil vapor sampling through the basement floor of both of the affected apartments. This intrusive activity required proactive public relations directly with the affected apartment residents. The vapor analytical results were compared to risk-based screening levels (RBSLs) for indoor air, which Terracon calculated using the procedures in DERR's Guidelines for Utah's Corrective Action Process. The results indicated vapor concentrations below the calculated RBSLs, and therefore are not contributing to excess risk to the apartment residents. Terracon developed a Corrective Action Plan (CAP) including a detailed remedial alternatives evaluation, selection of the preferred remedy, and remedial design. The selected remedy involves in-situ anaerobic bioremediation along with source removal and disposal. The CAP was approved by DERR in 2010 and Terracon directed the removal of impacted soils in the area of the former USTs and installed a network of 30 injection wells on the site and adjoining residential property for the injection of an anaerobic oil digester. To date, Terracon has directed 18 injection events, and benzene concentrations have been reduced by more than 85% since the initiation of corrective action on the site.

Construction Truck and Trailer – Salt Lake City, Utah
Project Manager for the ongoing investigation/remediation project after a diesel UST and new oil AST leaked on the site. Mr. Bowers conducted a Limited Site Investigation and identified TRPH and diesel constituents above regulatory limits in the soil and groundwater of the site. Several of the wells located between the existing shop area and former UST had measurable levels of free product (new oil) in the wells. Terracon directed the excavation of an area approximately 90' x 90' x 8' and 2,442 tons of impacted soil were disposed at a permitted disposal facility. Terracon is currently awaiting the approval of a Corrective Action Plan from the DERR and intends to remediate the remaining "hot spots" of soil and groundwater contamination that could not be excavated due to physical barriers on the site, (existing building and property fence line) with an anaerobic oil digester.

Brent Brown Chevrolet – Provo, Utah
As part of a property transaction, Terracon conducted a subsurface investigation in the service area of the Brent Brown Chevrolet and discovered that several underground hydraulic hoists had leaked and impacted the soil and groundwater of the site. Terracon directed the removal of the leaking hoists and excavated an area approximately 90'x25'x8' and removed the impacted soils for off-site disposal. Once the excavation was complete, approximately 2,000 gallons of free product (hydraulic oil) was removed from the groundwater surface within the excavation with a vacuum truck. Ten injection wells were installed within the impacted area for injections of BioRem 2000® oil digester. Twelve injection events were conducted over a one-year time-frame. Following the injection events, groundwater levels were reported below regulatory cleanup levels and a no further action letter was issued by the Utah Department of Water Quality.

SITE INVESTIGATION

The Scoular Company – Utah
As part of a property transaction, conducted an extensive subsurface investigation, including the delineation of a trichloroethylene (TCE) groundwater plume that migrated off the grain-handling facility site impacting an adjoining industrial park. The TCE plume is currently listed on the CERCLIS database as the "Ogden Industrial Park Plume." Mr. Bowers is currently providing the client litigation support and document review for additional site remediation efforts conducted by the previous owner's consultant.

The Scoular Company – Southeastern Idaho
Terracon conducted subsurface investigations on four grain-handling facilities in southeastern Idaho. Phase I ESAs previously conducted on the sites indicated the potential of soil and groundwater contamination from carbon tetrachloride that was used at one of the sites and potentially used at the others. Analytical results from the subsurface investigation were compared to the proper State of Utah, Federal and Idaho DEQ Risk Screening Process.

Merit Oil – Kansas, Colorado, and Oklahoma
Involved in a Modified Phase I ESA portfolio, including 2,604 oil and gas production locations, injection and disposal well locations, central tank batteries, and compressor stations in southwest Kansas, southeast Colorado, and northwest Oklahoma. Duties included field reconnaissance, NORM surveys, and reporting.

Associated Foods Stores – Salt Lake City, Utah
Project Manager for remediation efforts of a soil, groundwater, and free-phase product cleanup. The site was previously used as a fleet truck repair and refueling center. Site remediation activities included a pump and treat system, air sparging, free product recovery, and extensive soil excavations.

Richmond American Homes – South Jordan, Utah
Completed numerous limited site investigations to evaluate the presence of lead and arsenic in the on-site soils/fills for more than 250 residential lots within the Kennecott Land Daybreak development. Terracon conducted X-ray fluorescence (XRF) screening measurements on soil/fill samples to identify target samples for laboratory testing.

All Resort Coach, Inc. DBA Lewis Stages – Salt Lake City, Utah
Terracon conducted a Phase I ESA and limited site investigation as part of a property transaction. The limited site investigation revealed the presence of soil and groundwater contamination from existing underground storage tanks (USTs) above regulatory limits. Terracon directed efforts for the removal of three USTs, the contaminated soil removal and the repair of existing USTs to meet State of Utah standards and achieve regulatory closure.

APPENDIX F
DESCRIPTION OF TERMS AND ACRONYMS

Description of Selected General Terms and Acronyms

Term/Acronym	*Description*
ACM	Asbestos Containing Material. Asbestos is a naturally occurring mineral, three varieties of which (chrysotile, amosite, crocidolite) have been commonly used as fireproofing or binding agents in construction materials. Exposure to asbestos, as well as ACM, has been documented to cause lung diseases including asbestosis (scarring of the lung), lung cancer and mesothelioma (a cancer of the lung lining). Regulatory agencies have generally defined ACM as a material containing greater that one (1) percent asbestos, however some states (e.g. California) define ACM as materials having 0.1% asbestos. In order to define a homogenous material as non-ACM, a minimum number of samples must be collected from the material dependent upon its type and quantity. Homogenous materials defined as non-ACM must either have 1) no asbestos identified in all of its samples or 2) an identified asbestos concentration below the appropriate regulatory threshold. Asbestos concentrations are generally determined using polarized light microscopy or transmission electron microscopy. Point counting is an analytical method to statistically quantify the percentage of asbestos in a sample. The asbestos component of ACM may either be friable or non-friable. Friable materials, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure and have a higher potential for a fiber release than non-friable ACM. Non-friable ACM are materials that are firmly bound in a matrix by plastic, cement, etc. and, if handled carefully, will not become friable. Federal and state regulations require that either all suspect building materials be presumed ACM or that an asbestos survey be performed prior to renovation, dismantling, demolition, or other activities that may disturb potential ACM. Notifications are required prior to demolition and/or renovation activities that may impact the condition of ACM in a building. ACM removal may be required if the ACM is likely to be disturbed or damaged during the demolition or renovation. Abatement of friable or potentially friable ACM must be performed by a licensed abatement contractor in accordance with state rules and NESHAP. Additionally, OSHA regulations for work classification, worker training and worker protection will apply.
AHERA	Asbestos Hazard Emergency Response Act
AST	Aboveground Storage Tanks. ASTs are generally described as storage tanks less than 10% of which are below ground (i.e., buried). Tanks located in a basement, but not buried, are also considered ASTs. Whether, and the extent to which, an AST is regulated, is determined on a case-by-case basis and depends upon tank size, its contents and the jurisdiction of its location.
BGS	Below Ground Surface
Brownfields	State and/or tribal listing of Brownfield properties addressed by Cooperative Agreement Recipients or Targeted Brownfields Assessments.
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes. BTEX are VOC components found in gasoline and commonly used as analytical indicators of a petroleum hydrocarbon release.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (a.k.a. Superfund). CERCLA is the federal act that regulates abandoned or uncontrolled hazardous waste sites. Under this Act, joint and several liability may be imposed on potentially responsible parties for cleanup-related costs.
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System. An EPA compilation of sites having suspected or actual releases of hazardous substances to the environment. CERCLIS also contains information on site inspections, preliminary assessments and remediation of hazardous waste sites. These sites are typically reported to EPA by states and municipalities or by third parties pursuant to CERCLA Section 103.
CESQG	Conditionally Exempt Small Quantity Generators
CFR	Code of Federal Regulations

Description of Selected General Terms and Acronyms

Term/Acronym	*Description*
CREC	Controlled Recognized Environmental Condition is defined in ASTM E1527-13 as "a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (for example, as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority) , with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls). A condition considered by the environmental professional to be a controlled recognized environmental condition shall be listed in the findings section of the Phase I Environmental Site Assessment report, and as a recognized environmental condition in the conclusions section of the Phase I Environmental Site Assessment report."
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System. An EPA-maintained federal database which stores information on notifications of oil discharges and hazardous substance releases in quantities greater than the applicable reportable quantity under CERCLA. ERNS is a cooperative data-sharing effort between EPA, DOT, and the National Response Center.
ESA	Environmental Site Assessment
FRP	Fiberglass Reinforced Plastic
Hazardous Substance	As defined under CERCLA, this is (A) any substance designated pursuant to section 1321(b)(2)(A) of Title 33, (B) any element, compound, mixture, solution, or substance designated pursuant to section 9602 of this title; (C) any hazardous waste having characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (with some exclusions); (D) any toxic pollutant listed under section 1317(a) of Title 33; (E) any hazardous air pollutant listed under section 112 of the Clean Air Act; and (F) any imminently hazardous chemical substance or mixture with respect to which the EPA Administrator has taken action under section 2606 of Title 15. This term does not include petroleum, including crude oil or any fraction thereof which is not otherwise listed as a hazardous substance under subparagraphs (A) through (F) above, and the term include natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).
Hazardous Waste	This is defined as having characteristics identified or listed under section 3001 of the Solid Waste Disposal Act (with some exceptions). RCRA, as amended by the Solid Waste Disposal Act of 1980, defines this term as a "solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed."
HREC	Historical Recognized Environmental Condition is defined in ASTM E1527-13 as "a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted residential use criteria established by a regulatory authority, without subjecting the property to any required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls). Before calling the past release a historical recognized environmental condition, the environmental professional must determine whether the past release is a recognized environmental condition at the time of the Phase I Environmental Site Assessment is conducted (for example, if there has been a change in the regulatory criteria). If the EP considers the past release to be a recognized environmental condition at the time the Phase I ESA is conducted, the condition shall be included in the conclusions section of the report as a recognized environmental condition."
IC/EC	A listing of sites with institutional and/or engineering controls in place. IC include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls. EC include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.
ILP	Innocent Landowner/Operator Program
LQG	Large Quantity Generators
LUST	Leaking Underground Storage Tank. This is a federal term set forth under RCRA for leaking USTs. Some states also utilize this term.

Description of Selected General Terms and Acronyms

Term/Acronym	*Description*
MCL	Maximum Contaminant Level. This Safe Drinking Water concept (and also used by many states as a ground water cleanup criteria) refers to the limit on drinking water contamination that determines whether a supplier can deliver water from a specific source without treatment.
MSDS	Material Safety Data Sheets. Written/printed forms prepared by chemical manufacturers, importers and employers which identify the physical and chemical traits of hazardous chemicals under OSHA's Hazard Communication Standard.
NESHAP	National Emissions Standard for Hazardous Air Pollutants (Federal Clean Air Act). This part of the Clean Air Act regulates emissions of hazardous air pollutants.
NFRAP	Facilities where there is "No Further Remedial Action Planned," as more particularly described under the Records Review section of this report.
NOV	Notice of Violation. A notice of violation or similar citation issued to an entity, company or individual by a state or federal regulatory body indicating a violation of applicable rule or regulations has been identified.
NPDES	National Pollutant Discharge Elimination System (Clean Water Act). The federal permit system for discharges of polluted water.
NPL	The NPL is the EPA's database of uncontrolled or abandoned hazardous waste facilities that have been listed for priority remedial actions under the Superfund Program.
OSHA	Occupational Safety and Health Administration or Occupational Safety and Health Act
PACM	Presumed Asbestos-Containing Material. A material that is suspected of containing or presumed to contain asbestos but which has not been analyzed to confirm the presence or absence of asbestos.
PCB	Polychlorinated Biphenyl. A halogenated organic compound commonly in the form of a viscous liquid or resin, a flowing yellow oil, or a waxy solid. This compound was historically used as dielectric fluid in electrical equipment (such as electrical transformers and capacitors, electrical ballasts, hydraulic and heat transfer fluids), and for numerous heat and fire sensitive applications. PCB was preferred due to its durability, stability (even at high temperatures), good chemical resistance, low volatility, flammability, and conductivity. PCBs, however, do not break down in the environment and are classified by the EPA as a suspected carcinogen. 1978 regulations, under the Toxic Substances Control Act, prohibit manufacturing of PCB-containing equipment; however, some of this equipment may still be in use today.
pCi/L	picoCuries per Liter of Air. Unit of measurement for Radon and similar radioactive materials.
PLM	Polarized Light Microscopy (see ACM section of the report, if included in the scope of services)
PST	Petroleum Storage Tank. An AST or UST that contains a petroleum product.
Radon	A radioactive gas resulting from radioactive decay of naturally-occurring radioactive materials in rocks and soils containing uranium, granite, shale, phosphate, and pitchblende. Radon concentrations are measured in picoCuries per Liter of Air. Exposure to elevated levels of radon creates a risk of lung cancer; this risk generally increases as the level of radon and the duration of exposure increases. Outdoors, radon is diluted to such low concentrations that it usually does not present a health concern. However, radon can accumulate in building basements or similar enclosed spaces to levels that can pose a risk to human health. Indoor radon concentrations depend primarily upon the building's construction, design and the concentration of radon in the underlying soil and ground water. The EPA recommended annual average indoor "action level" concentration for residential structures is 4.0 pCi/l.
RCRA	Resource Conservation and Recovery Act. Federal act regulating solid and hazardous wastes from point of generation to time of disposal ('cradle to grave"). 42 U.S.C. 6901 et seq.
RCRA Generators	The RCRA Generators database, maintained by the EPA, lists facilities that generate hazardous waste as part of their normal business practices. Generators are listed as either large (LQG), small (SQG), or conditionally exempt (CESQG). LQG produce at least 1000 kg/month of non-acutely hazardous waste or 1 kg/month of acutely hazardous waste. SQG produce 100-1000 kg/month of non-acutely hazardous waste. CESQG are those that generate less than 100 kg/month of non-acutely hazardous waste.
RCRA CORRACTS/TSDs	The USEPA maintains a database of RCRA facilities associated with treatment, storage, and disposal (TSD) of hazardous materials which are undergoing "corrective action". A "corrective action" order is issued when there is a release of hazardous waste or constituents into the environment from a RCRA facility.
RCRA Non-CORRACTS/TSDs	The RCRA Non-CORRACTS/TSD Database is a compilation by the USEPA of facilities which report storage, transportation, treatment, or disposal of hazardous waste. Unlike the RCRA CORRACTS/TSD database, the RCRA Non-CORRACTS/TSD database does not include RCRA facilities where corrective action is required.

Description of Selected General Terms and Acronyms

Term/Acronym	*Description*
RCRA Violators List	RAATS. RCRA Administrative Actions Taken. RAATS information is now contained in the RCRIS database and includes records of administrative enforcement actions against facilities for noncompliance.
RCRIS	Resource Conservation and Recovery Information System, as defined in the Records Review section of this report.
REC	Recognized Environmental Conditions are defined by ASTM E1527-13 as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: 1) due to any release to the environment; 2) under conditions indicative of a release to the environment. *De minimis* conditions are not recognized environmental conditions."
SCL	State "CERCLIS" List (see SPL /State Priority List, below).
SPCC	Spill Prevention, Control and Countermeasures. SPCC plans are required under federal law (Clean Water Act and Oil Pollution Act) for any facility storing petroleum in tanks and/or containers of 55-gallons or more that when taken in aggregate exceed 1,320 gallons. SPCC plans are also required for facilities with underground petroleum storage tanks with capacities of over 42,000 gallons. Many states have similar spill prevention programs, which may have additional requirements.
SPL	State Priority List. State list of confirmed sites having contamination in which the state is actively involved in clean up activities or is actively pursuing potentially responsible parties for clean up. Sometimes referred to as a State "CERCLIS" List.
SQG	Small Quantity Generator
SWF/LF	State and/or Tribal database of Solid Waste/Landfill facilities. The database information may include the facility name, class, operation type, area, estimated operational life, and owner.
TPH	Total Petroleum Hydrocarbons
TRI	Toxic Release Inventory. Routine EPA report on releases of toxic chemicals to the environment based upon information submitted by entities subject to reporting under the Emergency Planning and Community Right to Know Act.
TSCA	Toxic Substances Control Act. A federal law regulating manufacture, import, processing and distribution of chemical substances not specifically regulated by other federal laws (such as asbestos, PCBs, lead-based paint and radon). 15 U.S.C 2601 et seq.
USACE	United States Army Corps of Engineers
USC	United States Code
USGS	United States Geological Survey
USNRCS	United States Department of Agriculture-Natural Resource Conservation Service
UST	Underground Storage Tank. Most federal and state regulations, as well as ASTM E1527-13, define this as any tank, incl., underground piping connected to the tank, that is or has been used to contain hazardous substances or petroleum products and the volume of which is 10% or more beneath the surface of the ground (i.e., buried).
VCP	State and/or Tribal facilities included as Voluntary Cleanup Program sites.
VOC	Volatile Organic Compound

Description of Selected General Terms and Acronyms

Term/Acronym	*Description*
Wetlands	Areas that are typically saturated with surface or ground water that creates an environment supportive of wetland vegetation (i.e., swamps, marshes, bogs). The Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1) defines wetlands as areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. For an area to be considered a jurisdictional wetland, it must meet the following criteria: more than 50 percent of the dominant plant species must be categorized as Obligate, Facultative Wetland, or Facultative on lists of plant species that occur in wetlands; the soil must be hydric; and, wetland hydrology must be present. The federal Clean Water Act which regulates "waters of the US," also regulates wetlands, a program jointly administered by the USACE and the EPA. Waters of the U.S. are defined as: (1) waters used in interstate or foreign commerce, including all waters subject to the ebb and flow of tides; (2) all interstate waters including interstate wetlands; (3) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, etc., which the use, degradation, or destruction could affect interstate/ foreign commerce; (4) all impoundments of waters otherwise defined as waters of the U. S., (5) tributaries of waters identified in 1 through 4 above; (6) the territorial seas; and (7) wetlands adjacent to waters identified in 1 through 6 above. Only the USACE has the authority to make a final wetlands jurisdictional determination.

2018d Terracon Consultants, Inc., 2018. *Phase II Environmental Site Assessment (Final), Salt Lake County Brownfields Assessment, EPA Cooperative Agreement No. 96835701, Hazardous Materials and Petroleum Grant for Salt Lake County – Schovaers Electronics Facility, 22 South Jeremy Street, Salt Lake City, Utah, ACRES ID #199723, Terracon Project No. 61177082*. Final Version issued January 9, 2019. (included in Appendix B)

Phase II Environmental Site Assessment (Final)

Salt Lake County Brownfields Assessment
EPA Cooperative Agreement No. 96835701
Hazardous Materials and Petroleum Grant for Salt Lake County
Schovaers Electronics
22 South Jeremy Street, Salt Lake City, Salt Lake County, Utah
ACRES ID #199723
August 13, 2018
Revised November 1, 2018
Final Version Issued January 9, 2019
Terracon Project No. 61177082 Task N

Prepared for:
Salt Lake County
Salt Lake City, Utah

Prepared by:
Terracon Consultants, Inc.
Midvale, Utah

August 13, 2018
Revised November 1, 2018
Final Version Issued January 9, 2019

Salt Lake County Economic Development
2001 South State Street
Salt Lake City, UT 84114-3300

Attn: Mr. Ruedigar Matthes
P: 385-468-4868
E: RMatthes@slco.org

Re: Phase II Environmental Site Assessment - Schovaers Electronics (Final)
Salt Lake County Brownfields Assessment
Hazardous Materials and Petroleum Grant for Salt Lake County
EPA Cooperative Agreement No. 96835701 / ACRES ID# 199723
22 South Jeremy Street, Salt Lake City, Salt Lake County, Utah
Terracon Project No. 61177082

Dear Mr. Matthes:

Terracon Consultants, Inc. (Terracon) is pleased to submit our report for Phase II Site Investigation activities completed at the above-referenced site. EPA approved this site for eligibility under a Site Eligibility Determination Outline (EPA Region 8, August 22, 2017). The report presents data from field activities that included the installation of soil borings for the collection of soil and groundwater samples, and the installation of sub-slab vapor sampling ports for the collection of sub-slab vapor samples. This investigation was approved by EPA under Cooperative Agreement #96835701 for Hazardous Substances commingled with Petroleum. The assessment was guided by a Sampling and Analysis Plan reviewed, amended and approved by EPA (May 1, 2018). Quality of data was guided by the EPA-approved Quality Assurance Project Plan, Revision 2 (Terracon; May 24, 2018).

Terracon appreciates this opportunity to provide environmental support services to Salt Lake County. Should you have any questions or require additional information, please do not hesitate to contact our office.

Sincerely,

Terracon Consultants, Inc.

Amy B. Findley
Senior Project Manager

Andy R. King
Senior Project Manager

Benjamin Bowers
Environmental Department Manager

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PHASE II ENVIRONMENTAL SITE ASSESSMENT (FINAL)
SALT LAKE COUNTY BROWNFIELDS ASSESSMENT
EPA COOPERATIVE AGREEMENT NO. 96835701
HAZARDOUS MATERIALS AND PETROLEUM GRANT FOR
SALT LAKE COUNTY
SCHOVAERS ELECTRONICS
22 SOUTH JEREMY STREET, SALT LAKE CITY, UTAH
ACRES ID #199723

Terracon Project No. 61177082
August 13, 2018
Revised November 1, 2018
Final Version Issued January 9, 2019

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed a Phase II Site Investigation at the Schovaers Electronics site, located at 22 South Jeremy Street, Salt Lake City, Utah, as described in the approved Sampling and Analysis Plan, dated May 1, 2018. This Phase II Site Investigation was completed with funding from the Salt Lake County Brownfields Assessment Grant.

1.1 Brownfields Setting

Salt Lake County (the Grantee) is a recipient of an EPA community-wide assessment grant to inventory, characterize, assess, and conduct cleanup planning along with public outreach activities for eligible Brownfield sites located within County boundaries.

The Schovaers Electronics site is identified in EPA's online Assessment, Cleanup and Redevelopment Exchange System (ACRES) as Number 199723. This property was approved for assessment by EPA under a Site Eligibility Determination Outline (EPA Region 8, August 22, 2017), designated as hazardous substances commingled with petroleum[1].

As part of the previous Salt Lake City North Temple Brownfields Assessment Grant, Terracon conducted a Phase I Environmental Site Assessment (ESA) on the site (Terracon, 2015) and an Asbestos and Hazardous Materials Survey (Terracon, 2016) was conducted to identify any material that may require special handling or disposal requirements during demolition. In

[1] *Previous assessments of this property as part of Salt Lake City's Assessment Grant (#96809601) were conducted under an earlier Site Eligibility Determination Outline (SEDO) dated February 6, 2015, which had indicated Hazardous Substances as the known or suspected contaminant(s). The 2017 SEDO for this property, prepared by Salt Lake County under its Assessment Grant (#96835701), indicated the known or suspected contaminant(s) as Hazardous Substances commingled with Petroleum, although petroleum contamination has not been identified as a concern at the property.*

response to the Recognized Environmental Conditions (RECs) identified in the Phase I ESA, a Phase II ESA was performed under the grant by Terracon (Terracon, 2016). A second Phase I ESA was initiated in 2017 (Terracon, 2018) that recommended an additional site investigation be conducted to assess the vertical and horizontal impacts identified in the 2016 Phase II ESA. Definition of impacted soils and groundwater will be used to develop remedial strategies and/or management plans for future re-development of the property.

This supplemental Phase II Site Assessment was guided by a Sampling and Analysis Plan (SAP) reviewed, amended and approved by EPA (May 1, 2018). Quality of assessment data was guided by the SAP and EPA-approved Quality Assurance Project Plan (QAPP), (Revision 2, May 24, 2018).

1.2 Site Description and Background

Site Name	Schovaers Electronics (the site)
Site Location/Address	22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #	199723
General Site Description and Use	The site is an approximately 0.34-acre parcel (Parcel ID #15-02-204-007). An approximately 6,000-square-foot industrial building occupies the site. An approximately 672-square-foot garage is present on the northwest side of the site. Paved parking areas are located to the east and north of the building. A small weedy area is present on the western boundary area. The building is currently vacant.

Terracon conducted an initial Phase I Environmental Site Assessment (ESA) on the site in 2015. The Phase I ESA was compliant with Brownfields All Appropriate Inquiry and was performed in conformance with the scope and limitations of American Society for Testing and Materials (ASTM) Practice E1527-13 for the parcel located at 22 South Jeremy Street in Salt Lake City, Salt Lake County, Utah. The purpose of the Phase I ESA was to identify RECs in connection with the site, including the building and other improvements located on the site at the time of the reconnaissance. Terracon's 2015 Phase I ESA identified multiple RECs in connection with the property, and recommended a Phase II ESA be conducted to determine if the identified RECs had impacted the soils or groundwater at the site.

Terracon conducted the recommended Phase II ESA in 2015. The investigation identified soil impacts in the form of hexavalent chromium in shallow soils across the site. Concentrations of trichloroethene (TCE) and dissolved hexavalent chromium were reported in groundwater samples. The concentrations of dissolved hexavalent chromium appeared to be highest on the western side of the property. However, both TCE and hexavalent chromium were reported at sample locations along the northern property boundary. These results suggested that an off-site source of contamination may be present. The current investigation also encountered soil and groundwater impacts that appear to have emanated from on-site historical operations.

A second Phase I ESA was initiated in 2017 (Terracon, 2018) that recommended an additional Phase II ESA be conducted to assess the vertical and horizontal extent of impacts to soils and the potential for migration of groundwater impacts onto the property reported in the 2015 Phase II ESA.

1.3 Standard of Care

Terracon's services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time. Terracon makes no warranties, either express or implied, regarding the findings, conclusions, or recommendations. Please note that Terracon does not warrant the work of laboratories, regulatory agencies, or other third parties supplying information used in the preparation of the report. These Phase II services were performed in accordance with the scope of work agreed with you, our client, as reflected in our proposal and consistent with ASTM E1903-11, *Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment.*

1.4 Additional Scope Limitations

Findings, conclusions, and recommendations resulting from these services are based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, non-detectable, or not present during these services. We cannot represent that the site contains no hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during this Phase II investigation. Subsurface conditions may vary from those encountered at specific borings or wells or during other surveys, tests, assessments, investigations, or exploratory services. The data, interpretations, findings, and our recommendations are based solely upon data obtained at the time and within the scope of these services.

1.5 Reliance

This report has been prepared for the exclusive use of Salt Lake County. Any authorization for use or reliance by any other party (except a governmental entity having jurisdiction over the site) is prohibited without the express written authorization of Salt Lake County and Terracon. Reliance by authorized parties will be subject to the terms, conditions, and limitations stated in the underlying contract between Salt Lake County and Terracon. The limitation of liability defined in the terms and conditions is the aggregate limit of Terracon's liability all relying parties unless otherwise agreed in writing.

2.0 PHASE II SITE INVESTIGATION

2.1 Scope

The proposed Phase II scope of work described in the SAP was intended to gather the necessary data to bridge the gaps identified in the Terracon 2016 Phase II ESA, the Terracon 2017 Phase I ESA, and to aid with providing the information needed to develop an Analysis of Brownfield Cleanup Alternatives (ABCA) for the site. These activities were conducted in accordance with a site-specific Sampling and Analysis Plan (SAP, Terracon 2018) that was prepared and approved by EPA for this site. The SAP established specific site objectives, sampling process design, and details regarding site-specific sampling and analyses, and was used in conjunction with the EPA-approved Quality Assurance Project Plan (QAPP, Terracon 2018).

2.2 Sampling Process Design

The sampling strategy for soil, groundwater, and soil vapor was designed to assess the vertical and horizontal extent of impacts to soils or groundwater at the site in order to augment the previous data as needed to develop cleanup planning documents for the site. Exterior borings were designed to assess the vertical extent of hexavalent chromium in areas where concentrations during the previous investigation were reported above the EPA Regional Screening Levels (RSLs). The interior borings were designed to assess the soil conditions below the building for the presence of metals and volatile organic compounds (VOCs) in both soil and groundwater.

Nine (9) soil borings (SE-SB-16 to 24) were advanced using direct-push drilling equipment to allow for the collection of subsurface soil and groundwater samples. The drilling and sampling locations are depicted on Exhibits 2 and 3; Appendix A. The soil borings were advanced to a maximum depth of approximately 16 feet below grade surface (bgs) to allow for sufficient water to collect groundwater samples. After sample collection was completed, each boring was properly abandoned by backfilling with bentonite clay pellets, adding water to hydrate the bentonite clay, and restoring the surface with native soil, asphalt, or concrete patch as appropriate to match the surrounding area. Samples were delivered to the analytical laboratory within holding times for all analytical methods to generate definitive analytical data, which are critical to this assessment.

Four (4) sub-slab soil vapor points were installed inside the building to allow for the collection of sub-slab soil vapor samples to assess the potential for vapor intrusion.

Tables 1 and 2 provide a summary description of the sample locations, sample types, sample naming convention, laboratory analyses, and sampling rationale.

TABLE 1 – SUMMARY OF SOIL BORINGS

Sample Location	Rationale	Sample IDs	Sample Matrix	Analytes
Northeast corner of property (exterior of building)	Area where Cr (VI) was found above RSLs, assess vertical soil impacts	SE-SB-16 2.5 ft SE-SB-16 5 ft SE-SB-16 7.5 ft SE-SB-16 10 ft	SS SS SS (Hold) SS (Hold)	Cr(VI), pH
Southwest corner of property (exterior of building)	Area where Cr (VI) was found above RSLs, assess vertical soil impacts	SE-SB-17 2.5 ft SE-SB-17 5 ft SE-SB-17 7.5 ft SE-SB-17 10 ft	SS SS SS (Hold) SS (Hold)	Cr(VI), pH
		SE-SB-17 GW*	GW	13 PP Metals[a], Cr(VI), VOCs[b], pH
Drill Press/ Router Room (interior of building)	Assess Northwest corner of building	SE-SB-18 3 ft SE-SB-18 8 ft	SS SS	13 PP Metals[a], Cr(VI), VOCs[b], pH
		SE-SB-18 GW	GW	13 PP Metals[a], Cr(VI), VOCs[b], pH
Washout Booth (interior of building)	Assess Northeast corner of building	SE-SB-19 4 ft SE-SB-19 8 ft	SS SS	13 PP Metals[a], Cr(VI), VOCs[b], pH
		SE-SB-19-GW	GW	13 PP Metals[a], Cr(VI), VOCs[b], pH
General area/sewer lateral and effluent sample location (interior of building)	Boring adjacent to sewer lateral and effluent collection point	SE-SB-20 3 ft SE-SB-20 11 ft	SS SS	13 PP Metals[a], Cr(VI), VOCs[b], pH
		SE-SB-20 GW	GW	13 PP Metals[a], Cr(VI), VOCs[b], pH
Plate Room (interior of building)	Floor sump connected to sewer line	SE-SB-21 3 ft SE-SB-21 7 ft	SS SS	13 PP Metals[a], Cr(VI), VOCs[b], pH
		SE-SB-21 GW	GW	13 PP Metals[a], Cr(VI), VOCs[b], pH

TABLE 1 – SUMMARY OF SOIL BORINGS (Continued)

Plate Room (interior of building)	South wall, heavy staining	SE-SB-22 3 ft	SS	13 PP Metals[a], Cr(VI), VOCs[b], pH
		SE-SB-22 8 ft	SS	
		SE-SB-22 GW	GW	13 PP Metals[a], Cr(VI), VOCs[b], pH
Plate Room (interior of building)	Center of room adjacent to former acid tank and electrolysis copper tank	SE-SB-23 3 ft	SS	13 PP Metals[a], Cr(VI), VOCs[b], pH
		SE-SB-23 10 ft	SS	
		SE-SB-23 GW	GW	13 PP Metals[a], Cr(VI), VOCs[b], pH
Plate Room (interior of building)	West wall, heavy staining	SE-SB-24 2-3 ft	SS	13 PP Metals[a], Cr(VI), VOCs[b], pH
		SE-SB-24 8 ft	SS	

a - 13 Priority Pollutant Metals. b – volatile organic compounds. SS – Soil Sample. GW – Groundwater Sample
* - Sample not included in the SAP.

TABLE 2
SUMMARY OF SUB-SLAB SOIL GAS SAMPLING

Sample Location	Rationale	Sample IDs	Sample Matrix	Analytes
Northwest part of building (interior of building)	Assess vapor intrusion potential	SE-VP-1	Soil Gas	VOCs[a]
Northeast part of building (interior of building)	Assess vapor intrusion potential	SE-VP-2	Soil Gas	VOCs[a]
Adjacent to sewer lateral (interior of building)	Assess vapor intrusion potential	SE-VP-3	Soil Gas	VOCs[a]
Plate Room (interior of building)	Assess vapor intrusion potential	SE-VP-4	Soil Gas	VOCs[a]

a – volatile organic compounds.

2.3 Field Data Collection

Following SAP approval, the public utility location service (Blue Stakes of Utah) was notified at least 48 hours prior to commencing any drilling activities. A private utility location service was

used to locate potential utilities or other subsurface obstacles in the immediate vicinity of each boring location.

On May 17 and 18, 2018, Terracon mobilized to the site to advance the borings. The mechanized drilling services were performed by a Utah-licensed well driller; Terracon environmental personnel directed and supervised the drilling activities, logged the soil borings, and collected field samples.

During advancement of the soil borings, soils were continuously cored in 5-foot intervals and observed to document subsurface soil types, color, relative moisture content, and sensory evidence of environmental impacts. The soil samples were field-screened using a portable photoionization detector (PID) – Mini Rae 3000 PID equipped with a 10.6 eV ultraviolet lamp to evaluate the potential presence of total volatile organic compounds (TVOCs). The unit measures TVOCs in sample headspace air relative to parts per million calibration gas equivalents in air and identified simply as “PPM” on soil boring logs.

The SAP identified boring SE-SB-24 for the collection of a groundwater sample. After boring installation, the borehole collapsed and a groundwater sample could not be collected. A second attempt was made to re-drill the boring, but it was unsuccessful. A groundwater sample was collected from boring SE-SB-17 in substitution.

Fill was encountered in several of the borings extending to depths up to 7.5 feet bgs. Soil boring SE-SB-21 encountered black staining from 6.5 to 9.5 feet bgs. Native soils consisted of silts and clays and silty sand and sand. Groundwater was encountered at approximately 9 to 13 feet bgs. PID readings ranges from 0 to 6.3 ppm, with the highest observed reading recorded in boring SE-SB-21 @ 7 feet bgs. Detailed lithological descriptions and PID readings are included on the soil boring logs provided in Appendix B. The 2016 subsurface established a groundwater gradient across the property as being to the west-southwest.

2.4 Soil Sampling

Soil samples were collected from direct-push borings following the procedures detailed in Standard Operating Procedure (SOP) 5, *Geoprobe Sampling*, which is provided in Appendix B of the EPA-approved QAPP.

- Sample locations SE-SB-16 and SE-SB-17 (Exterior): Four soil samples were collected from each boring at the predetermined depths of 2.5’, 5’, 7.5’ and 10’ bgs for vertical delineation of hexavalent chromium in soils.

- Sample locations SE-SB-18 through SE-SB-24 (Interior): Two soil samples were collected from each boring. One soil sample was collected from soil exhibiting the most elevated PID readings. Where no elevated PID reading was observed, one

sample was collected at approximately 3' below the floor slab, and the second sample between 7 to 11' bgs based on field observations.

2.5 Groundwater Sampling

Groundwater samples were collected from seven borings following the procedures detailed in SOP 5, *Geoprobe Sampling* located in Appendix B of the QAPP.

- Sample locations SE-SB-17, -18, -19, -20, -21, -22, -23.

2.6 Soil Gas Probe Installation

Sub-slab vapor samples were collected from four vapor pins installed within the concrete floor slab, following the procedures detailed in SOP-E.2120, *Soil Gas Sampling* – Sub-slab Pin Method located in Appendix C of the SAP.

2.7 Field QA/QC Samples

Field duplicate samples for soil and groundwater were collected at a rate of 10 percent. For this investigation, two field duplicate soil and one field duplicate groundwater samples were collected. The duplicates were given a fictitious identification so that the laboratory would be unaware of their duplicate status. The two borings selected for duplicate soil sampling were SE-SB-17 (duplicate sample ID SE-SB-27) and SE-SB-24 (duplicate sample ID SE-SB-34). The groundwater duplicate sample was collected from SE-SB-22 (duplicate sample ID SE-SB-32). Field duplicates for sub-slab vapor samples were not planned.

One trip blank (laboratory supplied blank) was specified for this site. The sample was included in the shipment with the samples submitted for analysis of VOCs.

2.8 Equipment Decontamination

Non-expendable sampling equipment was decontaminated at the beginning of the project and decontaminated between each sampling location. These items were hand-scrubbed in an Alconoxä and potable water solution and rinsed with potable water between sample locations. Drilling equipment was cleaned using a high-pressure washer prior to beginning the project and between boring locations.

2.9 Site Restoration

After sample collection was completed, each boring was properly abandoned by backfilling with bentonite clay pellets, adding water to hydrate the bentonite clay, and restoring the surface with existing soil, asphalt, or concrete patch as appropriate to match the surrounding area.

3.0 LABORATORY ANALYTICAL METHODS

All soil and groundwater samples (including field duplicates and trip blanks) were placed in iced coolers. The samples were shipped in iced coolers under chain-of-custody protocols via overnight courier to Environmental Science Corporation (ESC) analytical laboratory in Mt. Juliet, Tennessee (a Utah-Certified Laboratory).

The soil gas sample canisters were placed back into laboratory-supplied shipping containers and shipped under chain-of-custody protocols via overnight courier to ESC.

Samples were analyzed using the following methods:

TABLE 2 – ANALYTICAL METHOD SUMMARY

Parameter	Matrix (Solid/Liquid)	Analytical Method	No. of Samples[1]
VOCs	Soil	SW-846 8260B	15
VOCs	Groundwater	SW-846 8260B	8
VOCs	Soil Gas	TO-15	4
Metals - Priority Pollutants + Cr(VI)	Soil	SW-846 6010B, 3060A/7196A, 7471	15
Cr(VI)	Soil	SW-846 3060A/7196A	5
Metals (13 Priority Pollutants)	Groundwater	SW-846 6010B, 6020B, 6020	8
Cr(VI)	Groundwater	SW-846 218.6, 7199	8
pH	Soil	SW-846 9045D	15
pH	Groundwater	Field test	8

[1]Includes field duplicate samples.

4.0 SUMMARY OF ANALYTICAL RESULTS

The following sections summarize analytical results. Comparative screening levels were listed in the approved SAP; however, since the date of the SAP approval, the US EPA has issued updated Regional Screening Levels (RLSs; May 2018). These updated RSLs are shown in the summary tables. Utah DEQ comparative screening levels remain unchanged. A summary of the analytical results is provided in Tables C1 through C5 (Appendix C). Copies of the ESC analytical reports and sample chain-of-custody records are provided in Appendix D.

Constituent concentrations in soils were compared to current EPA RSLs for residential and industrial use scenarios, and to Utah Department of Environmental Quality (UDEQ) Leaking Underground Storage Tank (LUST) Initial Screening Levels (ISLs). Constituent concentrations in

groundwater were compared to EPA RSLs for tap water, UDEQ-LUST ISLs, Utah Ground Water Quality Protection Standards (UGWQPS; UAC-R317-6-2.1), EPA Maximum Contaminant Levels (MCLs) and EPA Vapor Intrusion Screening Levels (VISLs) Target Groundwater Concentration at a target cancer risk of $1X10^{-6}$ and target hazard quotient of 1.

4.1 Soil Data Summary

VOCs A total of 14 soil samples (excluding duplicates) were analyzed for VOCs. Several VOCs were detected in very low concentrations that did not exceed a regulatory screening level. The concentration of bromodichloromethane (SE-SB-21 @ 7) and TCE (SE-SB-22 @ 7 and SE-SB-24 @ 7) exceeded the EPA Residential RSL. The concentration of TCE reported from SE-SB-21 @ 7 exceeded the EPA Industrial RSL.

No other VOCs were reported above an EPA RSL or other applicable screening level.

Metals A total of 14 soil samples (excluding duplicates) were analyzed for the 13 priority pollutant metals and hexavalent chromium. An additional four soil samples were analyzed for hexavalent chromium only.

Hexavalent chromium exceeded the EPA Residential RSL in four boring locations (SE-SB-16 @ 5, SE-SB-17 @ 2.5, SE-SB-19 @ 4 and 8, and SE-SB-23 @ 10). Depth of impacted soil ranged from 2.5 feet bgs to 10 feet bgs.

All soil samples detected arsenic concentrations above the EPA Residential RSL, with 13 out of 14 samples also exceeding the Industrial RSL. Lead exceeded the EPA Residential RSL in sample SE-SB-21 @ 7.

pH Soil pH ranged from 7.61 to 10.7.

4.2 Groundwater Data Summary

VOCs TCE was reported in six of the seven groundwater samples. The concentrations reported exceeded EPA RSLs, MCLs, or UGWQSs.

The concentration of TCE exceeded the EPA's Target Groundwater Residential VISL in five of the seven groundwater samples, with four of those samples exceeding the Target Groundwater Commercial VISL. Three of the groundwater samples exceeding the Target Groundwater Commercial VISL were collected inside the building.

Metals Six of the seven groundwater samples detected dissolved arsenic at a concentration above the EPA RSL for Tapwater. Five of the seven samples reported hexavalent chromium at a concentration exceeding the EPA RSL for Tapwater.

pH Field-measured pH was reported at 7 for all borings selected for groundwater sample collection.

4.3 Sub-slab Vapor Summary

VOCs Several VOCs were detected in very low concentrations that did not exceed a regulatory screening level. Napthalene was detected above the Target Sub-Slab Soil Gas Residential VISL in two vapor samples, with naphthalene exceeding the Target Sub-Slab Soil Gas Commercial VISL in one of those two samples. Trichloroethene was reported above the EPA Target Sub-Slab Soil Gas Residential VISL in all four samples, with three of those four samples exceeding the Target Sub-Slab Soil Gas Commercial VISL.

5.0 DATA QUALITY ASSESSMENT

All laboratory analytical data were subject to internal reduction and validation prior to external release of the data, as detailed in the laboratory's Quality Assurance Manual. Following receipt of the laboratory analytical results by Terracon, the data were reviewed to evaluate compliance with Data Quality Indicators (DQIs) outlined in Sections D1, D2, and D3 of the QAPP.

Documentation provided with the laboratory analytical results included a case narrative; analytical data with minimum detection limits and reporting limits listed for all analyses; surrogate recoveries for GC/MS analyses with laboratory control limits; chain-of-custody records; and a quality control summary, including method blanks, matrix spike/matrix spike duplicates (MS/MSD) with control limits, laboratory control samples and duplicates (LCS/LCSD) with control limits; and application of data qualifiers where warranted.

Assessment of the DQIs for Precision, Bias and Accuracy, Representativeness, Comparability, Completeness, and Sensitivity are presented in the following subsections.

5.1 Precision

Precision was evaluated on the basis of relative percent difference (RPD) as a measure of reproducibility between LCS/LCSD pairs and MS/MSD pairs (*analytical precision*) and between field samples and field duplicate samples (*field precision*).

Analytical Precision

A summary of the Quality Control assessment for *analytical precision* is presented in Table C10 (Appendix C) and is further discussed below.

- The RPDs for the LCS/LCSD pairs for lab set L995461 were within the laboratory's control limits, except for naphthalene and 1,2,3-trichlorobenzene for batch WG1114510 (groundwater sample analyses for VOCs by Method 8260B) and acetone for batch WG1114961 (soil sample analyses for VOCs by Method 8260B). Of the 378 constituents analyzed in the LCS/LCSD pairs, 375 (99.2%) were within the control limits for *Precision*. Each analytical batch was individually within the control limits. ***The LCS/LCSD pairs are considered within control for Precision.***

- The RPDs for the MS/MSD pairs for lab set L995461 were within the laboratory's control limits, except for hexavalent chromium for batches WG1114983 and WG1117105 (soil sample analyses for hexavalent chromium by Method 3060A/7196A), 2-chloroethyl vinyl ether for batch WG1114510 (groundwater sample analyses for VOCs by Method 8260B), and 37 of the VOCs for batch WG1116592 (soil sample analyses for VOCs by Method 8260B). Of the 241 constituents analyzed in the MS/MSD pairs, 201 (83.4%) were within the control limits for *Precision*. Four of the analytical batches were outside of the control limits (WG1114983, WG1117105, WG1114510, and WG1116592).

    - **Batch WG1114983:** Hexavalent chromium in these 14 soil samples was generally reported at concentrations above its residential RSL or had LRLs that exceeded its residential RSL. As the *Precision* could affect the conclusions regarding these results, ***hexavalent chromium analytical results in soil should be considered qualified***.

    - **Batch WG1117105:** Hexavalent chromium in soil sample SE-SB-24 (7) had a LRL that exceeded its residential RSL. As the *Precision* could affect the conclusions regarding these results, ***hexavalent chromium analytical results in soil should be considered qualified***.

    - **Batch WG1114510:** 2-chloroethyl vinyl ether was not reported above the LRL for the MS or MSD analyses. While the MS and MSD results were both non-detect, which is technically within control, neither analyses detected the spiked amount of this compound. The MS and MDS results were flagged with J6 (The sample matrix interfered with the ability to make any accurate determination; spike value is low.). 2-chloroethyl vinyl ether was not reported in any of the groundwater samples analyzed above the LRL. Because this constituent was not detected and because regulatory screening levels have not been

established for this constituent, the MS/MSD pair *Precision* is not anticipated to affect the usability of the data for comparison to regulatory screening levels. ***The Precision for the MS/MSD pair is considered acceptable.***

- **Batch WG1116592:** One sample was affected by this MS/MSD pair *Precision* deviation in batch WG1116592, soil sample SE-SB-18 (8). As the constituents analyzed for this sample were reported as less than the method reporting limits (two J-flagged constituents reported at concentrations less than the reporting limits), the MS/MSD pair *Precision* is not anticipated to affect the usability of the data for comparison to regulatory screening levels. ***The Precision for the MS/MSD pairs is considered acceptable.***

- The RPDs for the LCS/LCSD pairs for lab set L995391 were within the laboratory's control limits for all constituents analyzed (soil gas analyses for VOCs by Method TO-15). ***The LCS/LCSD pairs are considered within control for Precision.***

- An MS/MSD pair was not analyzed or reported for lab set L995391 because MS/MSD analyses are not included in the TO-15 analytical method procedures for *Precision*.

Field Precision
A summary of the Quality Control assessment for *field precision* is presented in Table C10 (Appendix C) and is further discussed below.

- Per the QAPP, analytical results for field duplicate pairs that are less than five times the laboratory's reporting limit (LRL) were considered within control if the difference between the sample and its duplicate was less than the LRL (aqueous samples) or two times the LRL (solid samples). When analytical results for field duplicate pairs are greater than five times the LRL, the duplicate pair was considered within control when the RPDs for the field duplicate pairs were within the QAPP's control limits (25% for aqueous samples and 50% for solid samples). The field duplicate pair constituent analytical results were within control for lab set L995461, except for the following.

Field Duplicate Pair Analyses	**Constituents outside of *Precision* control limits**
VOCs in soil by Method 8260B for field duplicate pair SE-SB-24 (7) and SE-SB-34 (7):	benzene, 1,2-dichloropropane, ethylbenzene, isopropylbenzene, naphthalene, toluene, trichloroethene, 1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene, 1,3,5-trimethylbenzene, and total xylenes
Metals in soil by 6000/7000 Series Methods for field duplicate pair SE-SB-24 (7) and SE-SB-34 (7):	mercury (Method 7471A)

VOCs in groundwater by Method 8260B for field duplicate pair SE-SB-22 and SE-SB-32:	trichloroethene
Dissolved metals in groundwater by 6000/7000 Series Methods for field duplicate pair SE-SB-22 and SE-SB-32:	all constituents analyzed within the control limits

Of the 161 constituents analyzed in the field duplicate pairs, 148 (91.9%) were within the control limits for *Precision*. Each analysis was individually within the control limits, except for VOCs by Method 8260B for L995461-08 (sample) and L995461-28 (duplicate sample), which had 83% of the constituents in control. In general, the constituents that were outside of the control limits for *Precision* were reported at concentrations well below their regulatory screening levels. Two constituents, 1,2-dichloropropane and trichloroethene reported concentrations closer to their regulatory screening levels. For these two constituents, the *Precision* could affect the conclusions drawn with regards to the regulatory screening levels. As such, 1,2-dichloropropane and trichloroethene results should be considered qualified. Matrix interference was likely the primary cause of the lower percentage of valid data for this analysis in soils. ***The Precision for the field duplicate pairs is considered acceptable, except for 1,2-dichloropropane and trichloroethene in soils, which are considered to have qualified analytical results.***

5.2 Bias and Accuracy

Bias and ***Accuracy*** were evaluated through a review of the method blanks, trip blanks, percent recoveries for LCS/LCSD, and percent recoveries for MS/MSD summaries provided by the laboratory. Method blanks and trip blanks were considered within control if the constituents analyzed were less than the analytical method reporting limits. LCS/LCSD and MS/MSD analyses were considered within control if the percent recoveries were within the laboratories established limits. A summary of the Quality Control assessment for *Bias* and *Accuracy* is presented in Table C10 (Appendix C) and is further discussed below.

Lab Set L995461

- **Trip Blank:** The trip blank reported four constituents (acetone, cis-1,2-dichloroethene, toluene, and total xylenes), but the concentrations were less than the LRLs (i.e., J-flagged results). ***The Trip Blank is considered in control for Bias and Accuracy.***

- **Method Blank:** Constituents reported in the Method Blanks included tetrachloroethene and 1,2,3-trichlorobenzene in batch WG1114510, hexachloro-1,3-butadiene and 1,2,3-trichlorobenzene in batch WG1114542, and methylene chloride in batch WG1115967. The reported concentrations were less than the LRLs. ***The Method Blank is considered in control for Bias and Accuracy.***

- **LCS/LCSD:** The percent recoveries for constituents analyzed in the LCS and LCSD samples were within the laboratory's control limits, except for the following:

  - **Batch WG1115415:** acrolein (LCS), 1,2-dibromo-3-chloropropane (LCS and LCSD), and naphthalene (LCSD).
  - **Batch WG1114961:** 4-chlorotoluene (LCS).
  - **Batch WG1115967:** acetone (LCSD).
  - **Batch WG1116592:** 1,2-dichloroethene (LCS).

  Of the 886 constituents analyzed in the LCS and LCSD samples, 879 (99.2%) were within the control limits for *Bias* and *Accuracy*. Each analytical batch was individually within the control limits. ***The LCS/LCSD pairs are considered within control for Bias and Accuracy.***

- **MS/MSD:** The percent recoveries for constituents analyzed in the MS and MSD samples were within the laboratory's control limits, except for the following:

  - **Batch WG1114983 (soil):** hexavalent chromium (MS and MSD).
  - **Batch WG1117105 (soil):** hexavalent chromium (MS and MSD).
  - **Batch WG1113326 (groundwater):** hexavalent chromium-low level (MS).
  - **Batch WG1115713 (groundwater):** hexavalent chromium-low level (MS and MSD).
  - **Batch WG1114824 (soil):** antimony (MS and MSD) and zinc (MS and MSD).
  - **Batch WG1115667 (soil):** antimony (MS and MSD).
  - **Batch WG1114510 (groundwater):** 2-chloroethyl vinyl ether (MS and MSD).
  - **Batch WG1115967 (soil):** carbon tetrachloride (MS) and dichlorodifluoromethane (MS and MSD).
  - **Batch WG1116592 (soil):** p-isopropyltoluene (MS).

  Of the 482 constituents analyzed in the MS and MSD samples, 465 (96.5%) were within the control limits for *Bias* and *Accuracy*. For analytical batches WG1114983, WG1117105, WG1113326, WG1115713, and WG1114824, less than 90% of the data passed the QC criteria.

  - Hexavalent chromium was generally reported in soil at concentrations above its residential RSL or had LRLs that exceeded its residential RSL. As the *Bias* and *Accuracy* control could affect the conclusions regarding these results, ***hexavalent chromium analytical results in soil should be considered qualified***.

  - Hexavalent chromium-low level was generally reported in groundwater at concentrations above the tapwater RSL. As the *Bias* and *Accuracy* control could affect the conclusions regarding these results, ***hexavalent chromium-***

low level analytical results in groundwater should be considered qualified.

- Antimony and zinc concentrations reported in soil were orders of magnitude less than the residential RSLs. ***Bias and Accuracy control are unlikely to affect the conclusions regarding these results and they can be used for their intended purpose of comparison to the screening levels.***

- Regulatory screening levels have not been established for 2-chloroethyl vinyl ether or p-isopropyltoluene. As such, the ***Bias and Accuracy control is not anticipated to affect the conclusions of this report.***

- Carbon tetrachloride and dichlorodifluoromethane were not reported in soil above their LRLs, which were orders of magnitude less than the residential RSLs. ***Bias and Accuracy control are unlikely to affect the conclusions regarding these results and they can be used for their intended purpose of comparison to the screening levels.***

5.3 Representativeness

Representativeness is a qualitative parameter most concerned with proper design and execution of the sampling program to produce data that accurately and precisely represent environmental conditions. Selection of analytical methods, sampling methods and locations representative of the media sampled were set forth in the SAP. *Representativeness* in the field was achieved by implementing the approved SAP and using appropriate sampling methods, sample containers, sample handling and preservation methods. *Representativeness* in the laboratory was achieved by using the proper analytical procedures, meeting sample holding times, and analyzing and assessing laboratory QA/QC samples. Sample holding time requirements were achieved with the exception of pH. ***Per the DQIs in the QAPP, the Representativeness criteria have been met as the SOPs were followed, holding times were met (except for pH as mentioned above), and blanks reported constituents were less than the LRLs.***

5.4 Comparability

Comparability is a qualitative term expressing the confidence with which one data set can be compared to another. The comparability goal was achieved through the use of standardized sampling procedures in accordance with the SAP and QAPP, use of standardized and approved laboratory analytical methods, and reporting the analytical results in appropriate and consistent units.

- One trip blank (water matrix) was submitted with the 8 groundwater samples collected, which represents a frequency of 12.5% and exceeds the QAPP goal of 10%.

- One field duplicate (water matrix) was submitted with the 8 groundwater samples collected, which represents a frequency of 12.5% and exceeds the QAPP goal of 10%.

- Two field duplicates (soil matrix) were submitted with the 22 soil samples collected, which represents a frequency of 9.1%, below the QAPP goal of 10%. However, the number of field duplicates meets the two field duplicates that were specified in the approved SAP.

- The units of measure reported by the laboratory were consistent with the units of measure used by the regulatory screening levels.

- Samples were collected following the SOPs.

With the exception of the frequency of field duplicate samples for the soil matrix, which was slightly below its DQI but equal to the number specified in the SAP, the DQIs for *Comparability* were achieved. It is not anticipated that another field duplicate pair would alter the conclusions of this report. As such, ***Comparability was deemed acceptable.***

5.5 Completeness

Completeness is the ratio of valid measurements to the number of planned measurements, expressed as a percentage, and the completeness goal for the project is 90%. The sampling program is deemed to meet the DQIs for valid measurements, with the following exceptions.

- Results of hexavalent chromium in soil are considered qualified due to *Analytical Precision and Bias/Accuracy* not being within the control limits.

- Results of hexavalent chromium in groundwater are considered qualified due to *Bias/Accuracy* not being within the control limits.

- Results of 1,2-dichloropropane and trichloroethene in soil are considered qualified due to *Field Precision* not being within the control limits.

Sample matrix interference and heterogeneity are considered to be the principal reasons that some of the QC samples did not meet DQIs. ***With the exception of the analytes listed above, the analytical data are acceptable for their intended use in identifying constituent concentrations above applicable screening levels.***

Based on the very limited number of qualified analytical results, the overall ratio of valid measurements to measurements collected exceeds the 90% goal established in the QAPP.

5.6 Sensitivity

Sensitivity refers to the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest. The sensitivity goal is for LRLs to be below comparative screening levels, which vary considerably by analyte and in value and applicability. For analytes in soil samples, the LRLs were below available screening levels with the following exceptions: the LRL exceeded the EPA Residential RSL for hexavalent chromium, thallium, and 1,2-dibromo-3-chloropropane. Overall, the level of sensitivity was sufficient to allow the identification of soil constituents above Residential and Industrial RSLs, and groundwater impacts above MCLs, UGWPSs, Target Groundwater VISLs and Target Sub-Slab Soil Gas VISLs.

6.0 DATA EVALUATION

Following is an overview of the identified contaminants in soil, groundwater, and sub-slab soil vapor during the course of the current Phase II ESA.

6.1 Soil Sample Results

The presence of hexavalent chromium in soils both outside and underneath the building was confirmed at depths ranging from 1 to 10 feet bgs. The concentrations reported in this investigation exceeded the Residential RSL but did not exceed the Industrial RSL.

TCE was also identified in soils at 7 feet bgs at concentrations that exceeded the Residential and Industrial RSLs. The concentration of lead at 7 feet bgs exceeded the Residential RSL at one sample location (SE-SB-21).

Naphthalene was detected in soil at two locations within the Plating Room at a depth of 7 feet. The detections were below State of Utah and EPA screening levels.

As reported in the 2015 investigation and identified during this investigation, arsenic concentrations in soil samples collected throughout the site are higher than the industrial RSL of 3 mg/kg. However, such exceedances are common throughout the Salt Lake Valley area where background values reportedly range from non-detect to 97 mg/kg (U.S. Geological Survey Professional Paper 1270; 1984). The arsenic concentrations reported in site soil samples ranged from 4.62 to 17.5 mg/kg in the 2015 investigation, and from 1.6 to 52.9 mg/kg in the 2018 investigation. Based on these results, the reported arsenic concentrations in soil appear to be representative of natural background levels.

6.2 Groundwater Sample Results

Based on the results of this additional investigation, the presence of TCE in groundwater was confirmed at concentrations that exceed the MCL and Target Groundwater Commercial VISL.

The presence of dissolved hexavalent chromium in groundwater was confirmed at concentrations that exceeded the RSL for Tapwater but below the MCL for total chromium.

6.3 Sub-slab Vapor Sample Results

The results of the sub-slab soil gas samples collected from the interior of the building reported naphthalene and TCE were present at concentrations that exceeded the Target Sub-Slab Soil Gas Commercial VISL. TCE was detected in all four of the soil gas samples with three (VP-1, VP-3 and VP-4) exceeding the Commercial VISL and VP-2 exceeding the Residential VISL The highest concentrations were in the Plating Shop (VP-4) and along the sewer lateral (VP-3). Naphthalene was detected in sub-slab soil gas above the Commercial VISL along the sewer lateral (VP-3) and above the Residential VISL in the Washout Booth (VP-2). Based on the sub-slab soil gas sampling results, It appears there is a potential for vapor intrusion at this site.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

Impacts to soil and groundwater exceeding EPA RSLs for both Residential and Industrial land use have been identified at the site.

Soil impacts include bromodichloromethane and lead above the Residential RSL at 7 feet bgs, and TCE above the Residential and Industrial RSL at 7 feet bgs. Concentrations of hexavalent chromium exceeded the Industrial RSL in shallow soils and the Residential RSL at depths up to a minimum of 10 feet bgs.

Dissolved hexavalent chromium and arsenic were reported above the RSL for Tapwater in groundwater, but below the MCL. TCE was reported to exceed the EPA MCL and UGWQS, as well as the Target Groundwater Commercial VISL.

Both naphthalene and TCE were detected in sub-slab soil gas samples. Concentrations of TCE exceeded the Target Sub-Slab Target Soil Gas Commercial VISL in three locations within the building and the fourth exceeded the Residential VISL. The concentrations of naphthalene exceeded the Sub-Slab Target Soil Gas VISL in two of the samples. One exceeded the Commercial VISL and one exceeded the Residential VISL. The highest concentrations were from sample VP-3 located adjacent to a sewer lateral and collection point. The sewer lateral originates from a sump in the floor of the Plating Room. Use of small amounts of TCE (5 gallons or less) by

Schovaers has been documented. The origin of the naphthalene identified in two sub-slab soil gas samples is unknown but may be related to the undocumented subsurface fill throughout much of the site. Further investigation of naphthalene does not appear warranted at this time, as this compound has not been identified in groundwater and only two minor detections have been identified in soils. Addressing the sub-slab TCE soil gas will also address naphthalene in soil gas.

7.2 Extent of Impacts

TCE was not reported in soil samples collected outside the building during the 2016 investigation from depths ranging between 9.5 to 14.5 feet bgs. TCE was reported in soil samples collected during this investigation inside the building from depths ranging between 3 to 10 feet bgs. The highest concentration of TCE reported in soil (45.2 mg/kg) and groundwater (0.0766 mg/L) was observed in boring SE-SB-21, adjacent to the sump located inside the building. Based on results from the 2016 investigation and this investigation, dissolved TCE concentrations in groundwater above the drinking water MCL are present beneath the western portion of the building and the western portion of the property outside the building footprint. As dissolved TCE was not reported along the up-gradient east-northeast property boundary in previous borings SE-SB-09, -12, -13, -14, -15, and the highest concentrations of TCE were observed inside the building, it appears that the subject property may be a likely source of TCE.

Hexavalent chromium was reported in soils inside the building at concentrations exceeding the Residential RSLs, and outside the building exceeding both the Residential and Industrial RSLs, at various depths. The highest concentrations of hexavalent chromium observed in soils, exceeding the Industrial RSLs, were reported from the southwest side of the property. Hexavalent chromium was also present in soils on the south side of the property. The highest concentrations of dissolved hexavalent chromium were also reported on the west side of the property.

Schovaers did not report the use of hexavalent chromium at the facility. Hexavalent chromium was reported in soils and in groundwater at the north-adjoining Crown Plating facility; however, the highest concentrations reported in soils and groundwater at the Schovaers property were not reported on the north side of the property. The concentrations of hexavalent chromium reported in soils and groundwater, and the calculated groundwater flow direction for both the Crown Plating facility and Schovaers, do not definitively support Crown Plating as the source. The source of hexavalent chromium on the Schovaers property is unknown.

7.3 Recommendations

The 2015 Asbestos and Hazardous Materials Survey identified friable and non-friable asbestos-containing material and also identified several universal hazardous waste materials that would need to be properly disposed or recycled prior to demolition.

Soils impacted above applicable screening levels may need to be removed and properly disposed during construction or managed as part of future redevelopment. Impacted groundwater may need to be managed during construction, and may need to be addressed through monitored natural attenuation or active remediation. Future development would need to address impacts in a manner that is consistent with the planned land use in the area. As the concentrations of TCE in groundwater and sub-slab soil gas exceeded both Residential and Industrial Target VISLs, the potential for vapor intrusion should be evaluated and mitigated.

Planning for future redevelopment in the area must take into consideration the results of the investigations conducted at the site. In evaluating Brownfields re-use of the property, it may be appropriate to consider redevelopment-specific land use and contaminant exposures, including vapor intrusion mitigation. Evaluation might consider land use-specific and contaminant-specific risk assessments.

8.0 REFERENCES

Terracon Consultants, Inc. (Terracon)

2015 *Phase I Environmental Site Assessment, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County,* August 31, 2015.

2016 *Asbestos and Hazardous Materials Survey, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County,* January 18, 2016.

2016 *Phase II Environmental Site Assessment, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County,* February 2, 2016.

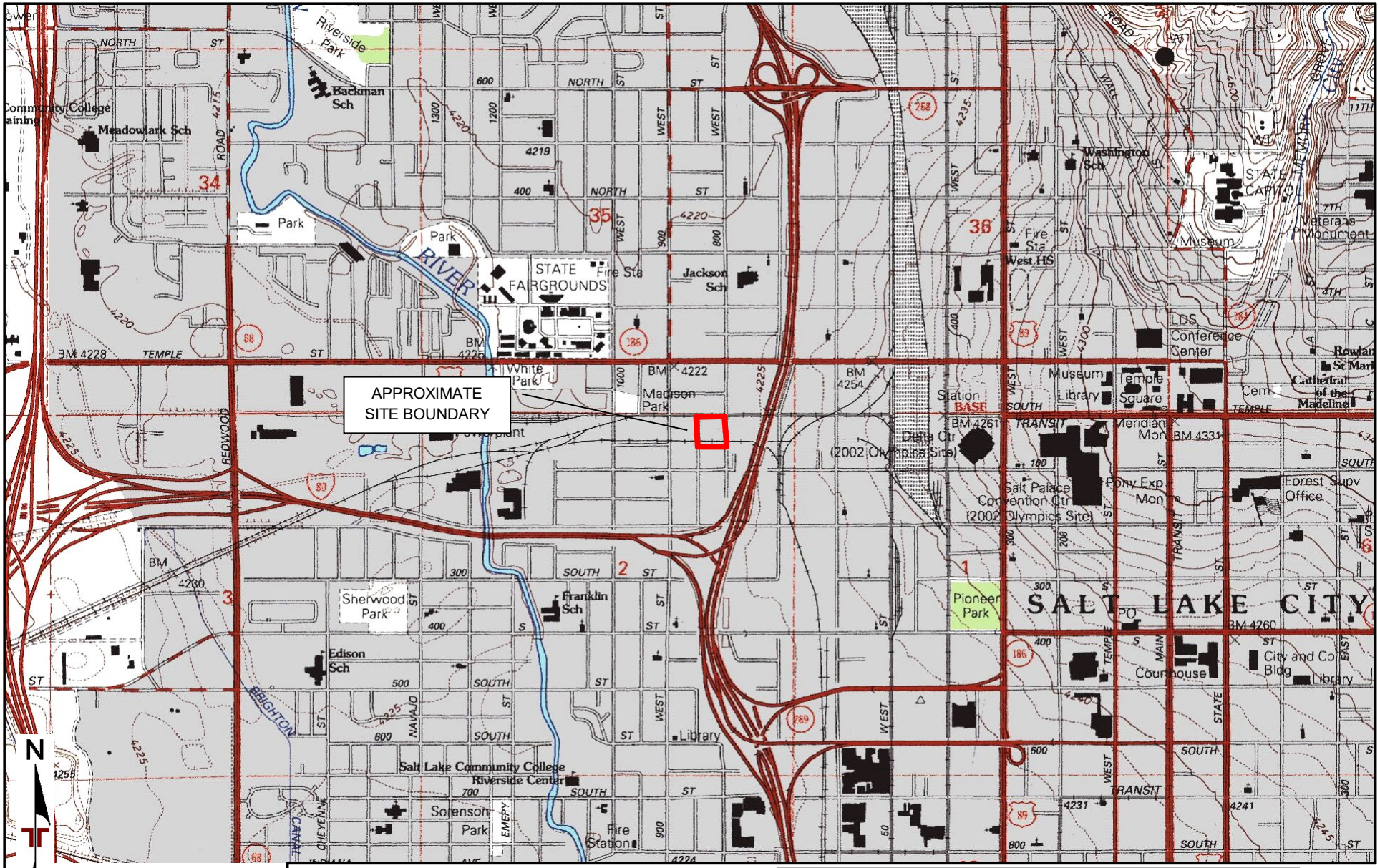
2018 *Community Wide Quality Assurance Project Plan, Salt Lake County Brownfields Assessment, EPA Cooperative Agreement No. 96835701, Salt Lake County, Utah,* Revision 2, May 24, 2018.

2018 *Phase I Environmental Site Assessment, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County,* February 14, 2018.

2018 *Sampling and Analyses Plan, Salt Lake County Brownfields Assessment, EPA Cooperative Agreement No. 96835701, Hazardous Materials and Petroleum Grant for Salt Lake County, Schovaers Electronics, 22 South Jeremy Street, Salt Lake City, Salt Lake County, Utah,* May 1, 2018.

U.S. Geological Survey Professional Paper 1270; Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States 1984

APPENDIX A
Exhibits



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY QUADRANGLES INCLUDE: SALT LAKE CITY NORTH, UT (1/1/1998).

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	CAS
Drawn by:	CAS
Checked by:	BBB
Approved by:	BBB

Project No.	61177082
Scale:	1"=2,000'
File Name:	Exhibit 1 & 2
Date:	6/26/2018

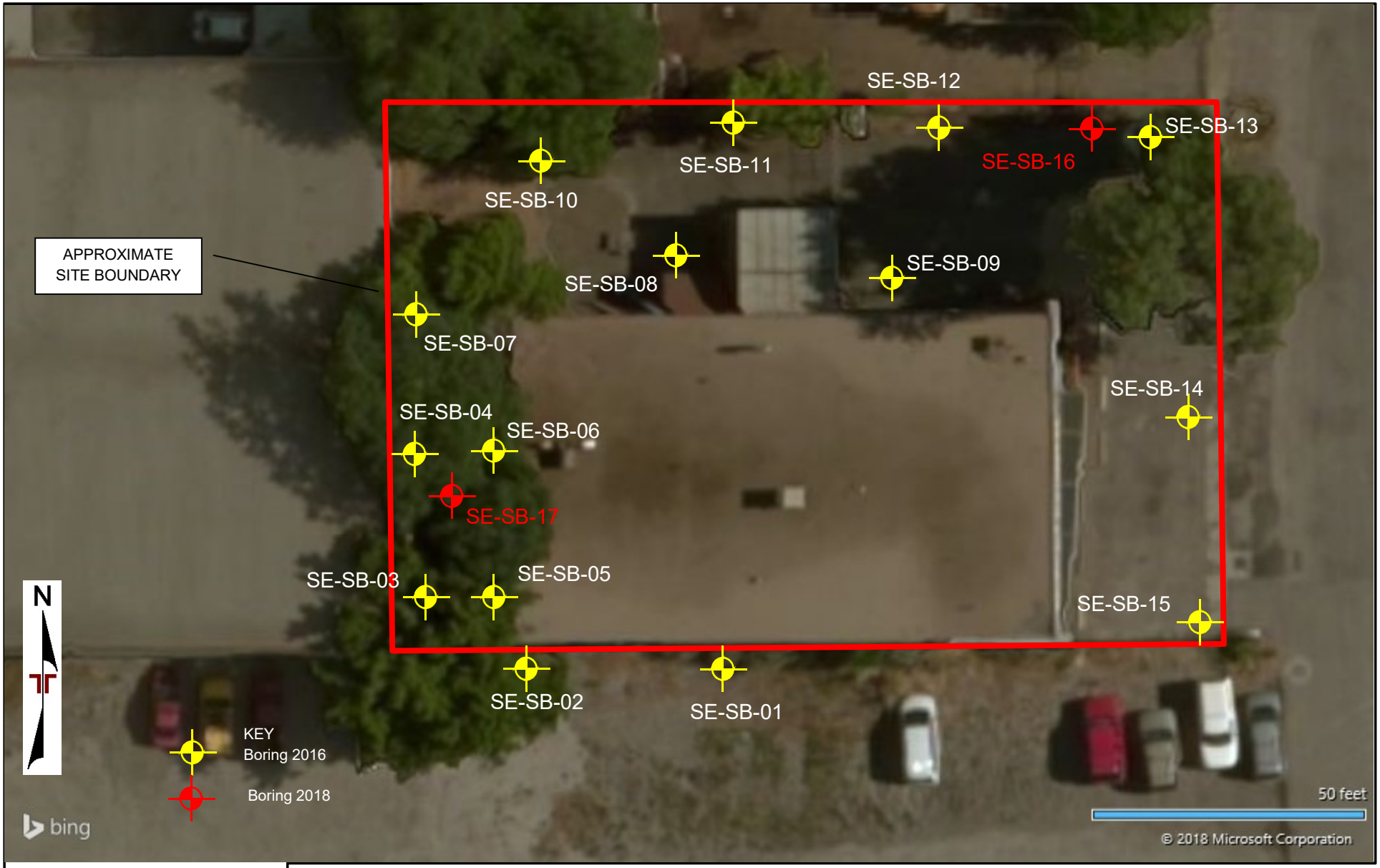
Terracon
6949 S High Tech Dr Ste 100
Midvale, UT 84047-3707

TOPOGRAPHIC MAP

Schovaers Electronics
Salt Lake County Brownfields Assessment

U.S. EPA Cooperative Agreement No. 96835701-0
Salt Lake County, UT

Exhibit
1



AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	ARK
Drawn by:	DMJ
Checked by:	AF
Approved by:	BBB

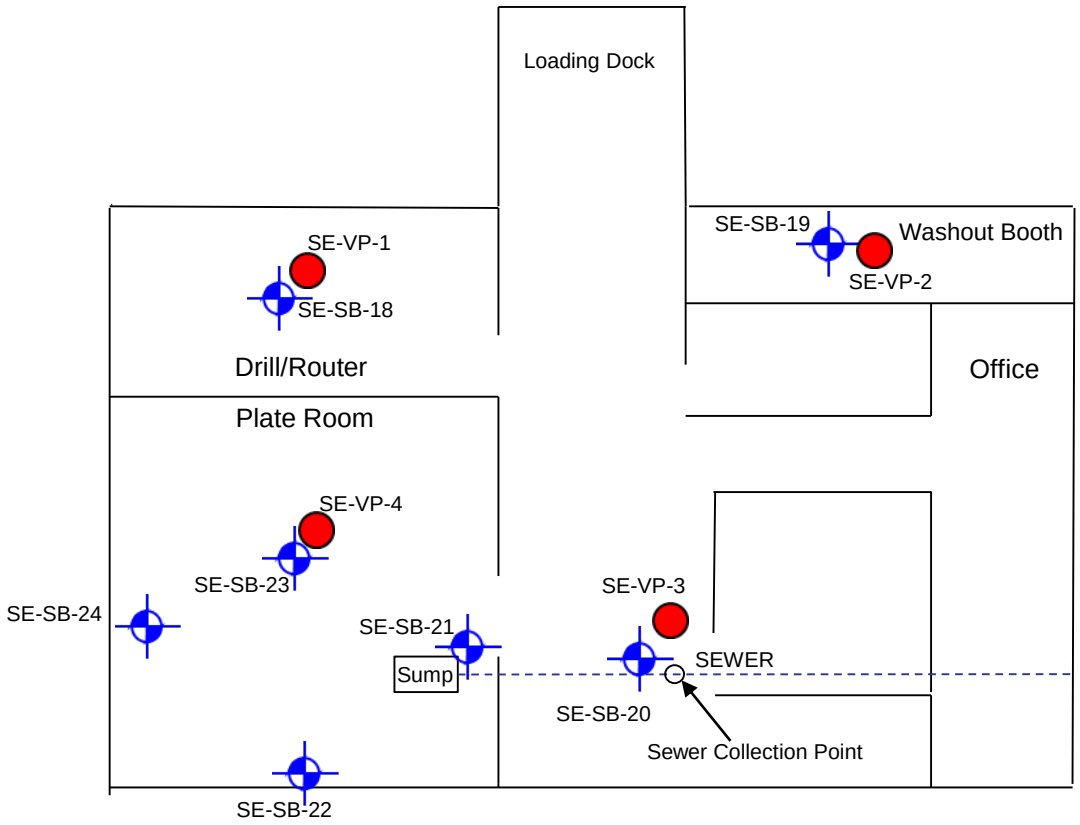
Project No.	61177082
Scale:	AS SHOWN
File Name:	Exhibit 1 & 2
Date:	6/26/2018

Terracon
6949 S High Tech Dr Ste 100
Midvale, UT 84047-3707

EXTERIOR SAMPLING LOCATIONS

Schovaers Electronics
Salt Lake County Brownfields Assessment
U.S. EPA Cooperative Agreement No. 96835701-0
Salt Lake County, UT

Exhibit
2



KEY

Soil Boring-2018

Sub slab vapor sample-2018

N

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: ARK	Project No. 61177082
Drawn by: DMJ	Scale: N.T.S.
Checked by: AF	File Name: Exhibit 3
Approved by: BBB	Date: 6/26/2018

Terracon
Consulting Engineers & Scientists
6949 S High Tech Dr Ste 100
Midvale, UT 84047-3707

INTERIOR SAMPLING LOCATIONS

Schovaers Electronics

Salt Lake County Brownfields Assessment

U.S. EPA Cooperative Agreement No. 96835701-0

Salt Lake County, UT

Exhibit 3

APPENDIX B
Soil Boring Logs

PROBE LOG NO. SE-SB-16

PROJECT: Salt Lake County Brownfields Assessment
Schovaers Electronics

CLIENT: Salt Lake County

SITE: 22 South Jeremy Street
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
	FILL - SILTY SAND WITH GRAVEL (SM), fine grained, brown, moist, loose, no odors, no staining					0	
					40	0.1	SE-SB-16 (2.5)
						0	
						0	
5.0						0	
	SANDY SILTY CLAY (CL-ML), fine grained, tan, moist, medium stiff, no odors, no staining	5				0	
7.0						0.1	
	SILT (ML), tan, moist, stiff, no odors, no staining				60	0.1	SE-SB-16 (5)
						0	SE-SB-16 (7.5)
9.0			▽			0	
	POORLY GRADED SAND (SP), fine grained, tan, wet, loose, no odors, no staining						
10.0		10				0	SE-SB-16 (10)
	Probe Terminated at 10 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

SE-SB-16 (2.5) 13:40
SE-SB-16 (5) 13:42
SE-SB-16 (7.5) 13:46
SE-SB-16 (10) 13:50

WATER LEVEL OBSERVATIONS

▽

Terracon
6949 S High Tech Dr, Ste 100
Midvale, UT

Probe Started: 05-17-2018 | Probe Completed: 05-17-2018
Drill Rig: 6620DT | Driller: DPS
Project No.: 61177082 | Exhibit: B-1

PROBE LOG NO. SE-SB-17

PROJECT: Salt Lake County Brownfields Assessment
Schovaers Electronics

CLIENT: Salt Lake County

SITE: 22 South Jeremy Street
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
	FILL - SILTY SAND WITH GRAVEL (SM), fine grained, dark brown, moist, loose, no odors, no staining					0	
					30	0	SE-SB-17 (2.5)
						0	
						0	
4.5						0	
	CLAYEY SILT (CL-ML), dark gray, moist, stiff, no odors, no staining	5				0	
7.0						0	
	POORLY GRADED SAND (SP), fine grained, tan, moist, loose, no odors, no staining		▽		70	0	SE-SB-17 (5) SE-SB-17 (7.5)
						0	
10.0		10				0	SE-SB-17 (10)
	Probe Terminated at 10 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Boring backfilled with bentonite chips upon completion.

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

SE-SB-17 (2.5) 14:19
SE-SB-17 (5) 14:22 / B.D. SE-SB-27 (5) 15:30
SE-SB-17 (7.5) 14:27
SE-SB-17 (10) 14:30
SE-SB-17 GW 14:50

WATER LEVEL OBSERVATIONS

▽

Terracon
6949 S High Tech Dr, Ste 100
Midvale, UT

Probe Started: 05-17-2018 | Probe Completed: 05-17-2018
Drill Rig: 6620DT | Driller: DPS
Project No.: 61177082 | Exhibit: B-2

PROBE LOG NO. SE-SB-18

PROJECT: Salt Lake County Brownfields Assessment
Schovaers Electronics

CLIENT: Salt Lake County

SITE: 22 South Jeremy Street
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
0.5	**CONCRETE**, Concrete						
	FILL - FIII, fine grained, brown, moist, loose, silty sand with gravel, no odors, no staining				75	0 0 0	SE-SB-18 (3)
4.5	**FILL - SILTY SAND WITH GRAVEL (SM)**, fine grained, black, moist, loose, possible fill brick and glass were observed	5			90	0 0 0 0	
7.0	**SILT (ML)**, black, moist, stiff, no odors, no staining					0	
10.0	**SANDY LEAN CLAY (CL)**, fine grained, tan, moist, stiff, no odors, no staining	10			100	0 0 0 0	SE-SB-18 (8)
11.5	**POORLY GRADED SAND (SP)**, fine grained, tan, moist, loose, no odors, no staining		▽		100	0 0 0 0 0	
16.0	***Probe Terminated at 16 Feet***	15					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Boring backfilled with bentonite
Surface capped with concrete

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

SE-SB-18 (3) 12:58
SE-SB-18 (8) 13:05
SE-SB-18 GW 13:20

WATER LEVEL OBSERVATIONS

▽

Terracon
6949 S High Tech Dr, Ste 100
Midvale, UT

Probe Started: 05-17-2018
Probe Completed: 05-17-2018
Drill Rig: 420MT
Driller: DPS
Project No.: 61177082
Exhibit: B-3

PROBE LOG NO. SE-SB-19

PROJECT: Salt Lake County Brownfields Assessment
Schovaers Electronics

CLIENT: Salt Lake County

SITE: 22 South Jeremy Street
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
0.5	**CONCRETE**, Concrete						
	FILL - , No Recovery				0		
4.0							
	FILL - SILTY SAND WITH GRAVEL (SM), fine grained, black, moist, loose, possible fill brick and glass were observed	5			90	0.6 0 0 0	SE-SB-19 (4)
7.0							
	SANDY SILT (ML), fine grained, black, moist, medium stiff, no odors, no staining						
8.5							
	SANDY LEAN CLAY (CL), fine grained, brown, moist, stiff, no odors, no staining	10			100	0 0 0 0 0	SE-SB-19 (8)
11.0							
	SILT (ML), tan, moist, loose, no odors, no staining		▽				
13.0							
	POORLY GRADED SAND (SP), fine grained, tan, moist, loose, no odors, no staining	15			100	0 0 0 0 0	
16.0							
	Probe Terminated at 16 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Boring backfilled with bentonite
Surface capped with concrete

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

SE-SB-19 (4) 12:27
SE-SB-19 (8) 12:35
SE-SB-19 GW 12:43

WATER LEVEL OBSERVATIONS

▽

Terracon
6949 S High Tech Dr, Ste 100
Midvale, UT

Probe Started: 05-17-2018 | Probe Completed: 05-17-2018
Drill Rig: 420MT | Driller: DPS
Project No.: 61177082 | Exhibit: B-4

PROBE LOG NO. SE-SB-20

PROJECT: Salt Lake County Brownfields Assessment
Schovaers Electronics

CLIENT: Salt Lake County

SITE: 22 South Jeremy Street
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
0.5	**CONCRETE**, Concrete						
	FILL - SILTY SAND WITH GRAVEL (SM), fine grained, brown, moist, loose, no odors, no staining				60	0 0 0	SE-SB-20 (3)
4.5							
	FILL - SANDY SILTY CLAY (CL-ML), fine grained, black, moist, stiff, possible fill brick and glass were observed, no odors	5			100	0 0 0.1 0.2	
7.5							
	SANDY LEAN CLAY (CL), fine grained, dark gray, moist, stiff, no odors, no staining					0.1	
9.5							
	SILT (ML), tan, moist, stiff, no odors, no staining	10			100	0.2 0.1 0.2	SE-SB-20 (11)
11.5							
	POORLY GRADED SAND (SP), fine grained, tan, moist, loose, no odors, no staining					0	
					100	0 0	
		15				0	
16.0							
	Probe Terminated at 16 Feet					0	

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Boring backfilled with bentonite
Surface capped with concrete

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

SE-SB-20 (3) 11:50
SE-SB-20 (11) 11:58
SE-SB-20 GW 12:15

WATER LEVEL OBSERVATIONS

Terracon
6949 S High Tech Dr, Ste 100
Midvale, UT

Probe Started: 05-17-2018
Probe Completed: 05-17-2018
Drill Rig: 420MT
Driller: DPS
Project No.: 61177082
Exhibit: B-5

PROBE LOG NO. SE-SB-21

PROJECT: Salt Lake County Brownfields Assessment
Schovaers Electronics

CLIENT: Salt Lake County

SITE: 22 South Jeremy Street
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
0.5	**CONCRETE**, Concrete						
	FILL - SILTY SAND WITH GRAVEL (SM), fine grained, brown, moist, medium dense, no odors, no staining				80	0 0 0	SE-SB-21 (3)
3.0	**SILTY SAND (SM)**, fine grained, light brown, moist, medium dense, no odors, no staining	5				1.5	
6.0	**SANDY LEAN CLAY (CL)**, fine grained, brown, moist, stiff, Black stain 6.5 feet to 7.5 feet, no odor				90	0 5.5 6.3	SE-SB-21 (7)
7.5	**SILT (ML)**, tan, moist, stiff, Black stain 7.5 feet to 9.5 feet, no odor					4.5	
10.0	**POORLY GRADED SAND (SP)**, fine grained, tan, moist, loose, no odors, no staining	10			100	3.3 3.6 1.7	
			▽			0.9	
					100	1.0 0.9	
		15				0.5	
16.0	***Probe Terminated at 16 Feet***					0	

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Boring backfilled with bentonite
Surface capped with concrete

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

SE-SB-21 (3) 9:00
SE-SB-21 (7) 9:08
SE-SB-21 GW 12:15

WATER LEVEL OBSERVATIONS

▽

Terracon
6949 S High Tech Dr, Ste 100
Midvale, UT

Probe Started: 05-17-2018
Probe Completed: 05-17-2018
Drill Rig: 420MT
Driller: DPS
Project No.: 61177082
Exhibit: B-6

PROBE LOG NO. SE-SB-22

PROJECT: Salt Lake County Brownfields Assessment
Schovaers Electronics

CLIENT: Salt Lake County

SITE: 22 South Jeremy Street
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
0.5	**CONCRETE**, Concrete						
	FILL - SILTY SAND WITH GRAVEL (SM), fine grained, dark brown, moist, medium dense, no odors, no staining				60	0.3 0.5 0.8	SE-SB-22 (3)
3.0	**SILTY SAND (SM)**, fine grained, light brown, moist, loose, no odors, no staining	5			20	1.3 1.2	
6.5	**SANDY SILT (ML)**, fine grained, black, moist, medium stiff, no odors, no staining					1.1	
10.0	**POORLY GRADED SAND (SP)**, fine grained, brown, moist, loose, no odors, no staining	10	▽		70	1.7 1.0 0.5	SE-SB-22 (8)
13.0	**POORLY GRADED SAND (SP)**, fine grained, tan, moist, loose, no odors, no staining				50	0 0 0 0 0	
16.0	***Probe Terminated at 16 Feet***	15					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Boring backfilled with bentonite
Surface capped with concrete

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:
SE-SB-22 (3) 9:50
SE-SB-20 (8) 9:58
SE-SB-20 GW 10:10 / B.D. SE-SB-32 15:10

WATER LEVEL OBSERVATIONS

▽

Terracon
6949 S High Tech Dr, Ste 100
Midvale, UT

Probe Started: 05-17-2018
Probe Completed: 05-17-2018
Drill Rig: 420MT
Driller: DPS
Project No.: 61177082
Exhibit: B-7

PROBE LOG NO. SE-SB-23

PROJECT: Salt Lake County Brownfields Assessment
Schovaers Electronics

CLIENT: Salt Lake County

SITE: 22 South Jeremy Street
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
0.5	**CONCRETE**, Concrete						
	FILL - SILTY SAND WITH GRAVEL (SM), fine grained, dark brown, moist, medium dense, no odors, no staining				50	0 0 0.1	SE-SB-23 (3)
5.0	**SANDY SILTY CLAY (CL-ML)**, fine grained, black, moist, medium stiff, no odors, no staining	5			70	0.2 0 0.3 0.2	
8.5	**SILT (ML)**, tan, moist, stiff, no odors, no staining					0.2	
10.0	**POORLY GRADED SAND (SP)**, fine grained, tan, moist, loose, no odors, no staining	10			70	0.2 0.7 0.1	SE-SB-23 (10)
			▽			0	
					90 90	0 0	
16.0		15				0 0	
	Probe Terminated at 16 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Boring backfilled with bentonite
Surface capped with concrete

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

SE-SB-23 (3) 11:20
SE-SB-23 (10) 11:29
SE-SB-23 GW 11:40

WATER LEVEL OBSERVATIONS

▽

Terracon
6949 S High Tech Dr, Ste 100
Midvale, UT

Probe Started: 05-17-2018
Probe Completed: 05-17-2018
Drill Rig: 420MT
Driller: DPS
Project No.: 61177082
Exhibit: B-8

PROBE LOG NO. SE-SB-24

PROJECT: Salt Lake County Brownfields Assessment
Schovaers Electronics

CLIENT: Salt Lake County

SITE: 22 South Jeremy Street
Salt Lake City, Utah

LOCATION See Exhibit A-2

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (%)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
0.5	**CONCRETE**, Concrete						
	FILL - SILTY SAND WITH GRAVEL (SM), fine grained, dark brown, moist, loose, no odors, no staining				40	0.2 0.3 0.5	SE-SB-24 (3)
5.0		5					
	SANDY SILT (ML), fine grained, black, moist, medium stiff, no odors, no staining				100	0.2 0 0.2 0.5	SE-SB-24 (7)
8.5							
	SILT (ML), tan, moist, very stiff, no odors, no staining	10			100	0.3 0.3 0 0	
11.0							
	POORLY GRADED SAND (SP), fine grained, tan, moist, loose, no odors, no staining		▽		40	0 0 0 0	
16.0		15				0	
	Probe Terminated at 16 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Direct Push

Abandonment Method:
Boring backfilled with bentonite
Surface capped with concrete

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:
SE-SB-24 (3) 10:40
SE-SB-24 (7) 110:48 / B.D. SE-SB-34 (7) 15:20

WATER LEVEL OBSERVATIONS

▽

Terracon
6949 S High Tech Dr, Ste 100
Midvale, UT

Probe Started: 05-17-2018 | Probe Completed: 05-17-2018
Drill Rig: 420MT | Driller: DPS
Project No.: 61177082 | Exhibit: B-9

APPENDIX C
Data Summary Tables

Table C1 - VOCs in Soil
Schovaers Electronics Property - 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. 61177082

Lab Sample ID						L995461-01		L995461-02		L995461-04		L995461-05		L995461-07		L995461-08		L995461-09		L995461-10		L995461-12		L995461-13		L995461-15		L995461-16		L995461-18		L995461-19	
Client Sample ID						**SE-SB-21 (3)**		**SE-SB-21 (7)**		**SE-SB-22 (3)**		**SE-SB-22 (7)**		**SE-SB-24 (3)**		**SE-SB-24 (7)**		**SE-SB-23 (3)**		**SE-SB-23 (10)**		**SE-SB-20 (3)**		**SE-SB-20 (11)**		**SE-SB-19 (4)**		**SE-SB-19 (8)**		**SE-SB-18 (3)**		**SE-SB-18 (8)**	
Date Collected						05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018	
Method	**Analyte**	**Units**	**EPA RSL - Residential[1]**	**EPA RSL - Industrial[2]**	**UDEQ ISL[3]**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**
8260B	ACETONE	mg/kg	61000	670000	ne	<0.0153	J3	<0.0191	J3	<0.0178	J3	0.0169	J J3	<0.0175	J3	<0.0175	J3	0.0417	J3	0.023	J J3	<0.0175	J3	<0.0162	J3	<0.0166	J3	<0.0156	J3	<0.0183	J3	0.0177	J J3	0.0211	J
8260B	ACRYLONITRILE	mg/kg	0.25	1.1	ne	<0.00213		<0.00265		<0.00247		<0.00211		<0.00242		<0.00224		<0.00206		<0.00242		<0.00224		<0.00230		<0.00216		<0.00254		<0.00205		<0.00222	
8260B	BENZENE	mg/kg	1.2	5.1	0.2	<0.000448		0.0178		<0.000521		<0.000445		<0.000511		0.0103		<0.000434		<0.000510		<0.000472		<0.000485		<0.000455		<0.000534		<0.000432		<0.000467	
8260B	BROMOBENZENE	mg/kg	290	1800	ne	<0.00118		<0.00146		<0.00137		<0.00117		<0.00134		<0.00124		<0.00114		<0.00134		<0.00124		<0.00127		<0.00119		<0.00140		<0.00113		<0.00123	
8260B	BROMODICHLOROMETHANE	mg/kg	0.29	1.3	ne	<0.000882		0.46		<0.00103		<0.000876		<0.00101		<0.000929		<0.000855		<0.00100		<0.000931		<0.000956		<0.000896		<0.00105		<0.000851		<0.000919	
8260B	BROMOFORM	mg/kg	19	86	ne	<0.00669		<0.00837		<0.00779		<0.00665		<0.00764		<0.00705		<0.00649		<0.00762		<0.00706		<0.00725		<0.00680		<0.00798		<0.00646		<0.00698	
8260B	BROMOMETHANE	mg/kg	6.8	30	ne	<0.00414		<0.00518		<0.00482		<0.00411		<0.00473		<0.00436		<0.00401		<0.00472		<0.00437		<0.00449		<0.00421		<0.00494		<0.00400		<0.00432	
8260B	N-BUTYLBENZENE	mg/kg	3900	58000	ne	<0.00430		0.0067	J	<0.00500		<0.00427		<0.00490		<0.00453		<0.00417		<0.00489		<0.00453		<0.00466		<0.00437		<0.00513		<0.00415		<0.00448	
8260B	SEC-BUTYLBENZENE	mg/kg	7800	120000	ne	<0.00283		<0.00354		<0.00330		<0.00281		<0.00322		<0.00299		<0.00275		<0.00322		<0.00299		<0.00307		<0.00288		<0.00338		<0.00273		<0.00295	
8260B	TERT-BUTYLBENZENE	mg/kg	7800	120000	ne	<0.00173		<0.00217		<0.00202		<0.00172		<0.00198		0.00191	J	<0.00168		<0.00198		<0.00183		<0.00188		<0.00176		<0.00207		<0.00167		<0.00181	
8260B	CARBON TETRACHLORIDE	mg/kg	0.65	2.9	ne	<0.00121		<0.00152		<0.00141		<0.00120		<0.00137		<0.00127		<0.00117		<0.00138		<0.00128		<0.00131		<0.00123		<0.00144		<0.00117		<0.00126	
8260B	CHLOROBENZENE	mg/kg	280	1300	ne	<0.000641		<0.000802		<0.000746		<0.000637		<0.000731		<0.000676		<0.000622		<0.000730		<0.000677		<0.000695		<0.000652		<0.000765		<0.000619		<0.000669	
8260B	CHLORODIBROMOMETHANE	mg/kg	8.3	39	ne	<0.000504		<0.000630		<0.000586		<0.000500		<0.000574		<0.000530		<0.000488		<0.000574		<0.000531		<0.000546		<0.000512		<0.000601		<0.000486		<0.000525	
8260B	CHLOROETHANE	mg/kg	14000	57000	ne	<0.00121		<0.00152		<0.00141		<0.00120		<0.00137		<0.00127		<0.00117		<0.00138		<0.00128		<0.00131		<0.00123		<0.00144		<0.00117		<0.00126	
8260B	CHLOROFORM	mg/kg	0.32	1.4	ne	<0.000464		0.0117		<0.000541		0.000929	J	<0.000530		0.00185	J	<0.000450		<0.000529		<0.000490		<0.000503		<0.000472		<0.000554		<0.000448		<0.000484	
8260B	CHLOROMETHANE	mg/kg	110	460	ne	<0.00156		<0.00195		<0.00181		<0.00155		<0.00177		<0.00163		<0.00151		<0.00177		<0.00164		<0.00169		<0.00158		<0.00186		<0.00150		<0.00162	
8260B	2-CHLOROTOLUENE	mg/kg	1600	23000	ne	<0.00103		<0.00129		<0.00120		<0.00102		<0.00117		<0.00108		<0.000998		<0.00117		<0.00109		<0.00112		<0.00105		<0.00123		<0.000994		<0.00107	
8260B	4-CHLOROTOLUENE	mg/kg	1600	23000	ne	<0.00126	J4	<0.00158	J4	<0.00147	J4	<0.00126	J4	<0.00144	J4	<0.00133	J4	<0.00123	J4	<0.00144	J4	<0.00133	J4	<0.00137	J4	<0.00129	J4	<0.00151	J4	<0.00122	J4	<0.00132	
8260B	1,2-DIBROMO-3-CHLOROPROPANE	mg/kg	0.0053	0.064	ne	*<0.00571*		*<0.00714*		*<0.00664*		*<0.00567*		*<0.00651*		*<0.00601*		*<0.00553*		*<0.00650*		*<0.00602*		*<0.00619*		*<0.00580*		*<0.00681*		*<0.00551*		*<0.00595*	
8260B	1,2-DIBROMOETHANE	mg/kg	0.036	0.16	ne	<0.000588		<0.000735		<0.000684		<0.000584		<0.000671		<0.000619		<0.000570		<0.000669		<0.000620		<0.000637		<0.000597		<0.000701		<0.000567		<0.000613	
8260B	DIBROMOMETHANE	mg/kg	24	99	ne	<0.00112		<0.00140		<0.00130		<0.00111		<0.00128		<0.00118		<0.00109		<0.00127		<0.00118		<0.00121		<0.00114		<0.00134		<0.00108		<0.00117	
8260B	1,2-DICHLOROBENZENE	mg/kg	1800	9300	ne	<0.00162		<0.00203		<0.00189		<0.00161		<0.00185		<0.00170		<0.00157		<0.00185		<0.00171		<0.00176		<0.00165		<0.00194		<0.00157		<0.00169	
8260B	1,3-DICHLOROBENZENE	mg/kg	ne	ne	ne	<0.00190		<0.00238		<0.00221		<0.00189		<0.00217		<0.00201		<0.00184		<0.00217		<0.00201		<0.00206		<0.00193		<0.00227		<0.00184		<0.00198	
8260B	1,4-DICHLOROBENZENE	mg/kg	2.6	11	ne	0.00426	J	0.00402	J	0.00371	J	0.00361	J	0.00604	J	0.00416	J	0.003	J	0.00381	J	<0.00233		0.00286	J	0.00278	J	0.00281	J	0.00421	J	0.00442	J
8260B	DICHLORODIFLUOROMETHANE	mg/kg	87	370	ne	<0.000915		<0.00114		<0.00107		<0.000910		<0.00104		<0.000964		<0.000888		<0.00104		<0.000966		<0.000992		<0.000931		<0.00109		<0.000884		<0.000954	
8260B	1,1-DICHLOROETHANE	mg/kg	3.6	16	ne	<0.000643		<0.000804		<0.000749		<0.000639		<0.000733		<0.000678		<0.000624		<0.000733		<0.000679		<0.000697		<0.000654		<0.000768		<0.000621		<0.000671	
8260B	1,2-DICHLOROETHANE	mg/kg	0.46	2	ne	<0.000532		0.00105	J	<0.000619		<0.000528		0.00115	J	<0.000560		<0.000515		<0.000605		<0.000561		<0.000576		<0.000540		<0.000634		<0.000513		<0.000554	J4
8260B	1,1-DICHLOROETHENE	mg/kg	230	1000	ne	<0.000560		<0.000700		<0.000651		<0.000556		<0.000638		<0.000589		<0.000543		<0.000637		<0.000590		<0.000606		<0.000569		<0.000668		<0.000540		<0.000583	
8260B	CIS-1,2-DICHLOROETHENE	mg/kg	160	2300	ne	<0.000772		<0.000965		<0.000899		<0.000767		<0.000881		<0.000813		<0.000749		<0.000879		<0.000815		<0.000837		<0.000785		<0.000921		<0.000746		<0.000805	
8260B	TRANS-1,2-DICHLOROETHENE	mg/kg	1600	23000	ne	<0.00160		<0.00200		<0.00186		<0.00159		<0.00183		<0.00168		<0.00155		<0.00182		<0.00169		<0.00173		<0.00163		<0.00191		<0.00155		<0.00167	
8260B	1,2-DICHLOROPROPANE	mg/kg	2.5	11	ne	<0.00142		2.11	*	<0.00165		0.0574		<0.00162		0.0699		<0.00138		<0.00162		<0.00150		<0.00154		<0.00144		<0.00170		<0.00137		<0.00148	
8260B	1,1-DICHLOROPROPENE	mg/kg	ne	ne	ne	<0.000783		<0.000979		<0.000912		<0.000779		<0.000894		<0.000825		<0.000760		<0.000892		<0.000827		<0.000849		<0.000796		<0.000935		<0.000756		<0.000817	
8260B	1,3-DICHLOROPROPANE	mg/kg	1600	23000	ne	<0.00196		<0.00245		<0.00228		<0.00195		<0.00223		<0.00207		<0.00190		<0.00223		<0.00207		<0.00212		<0.00199		<0.00234		<0.00189		<0.00204	
8260B	CIS-1,3-DICHLOROPROPENE	mg/kg	ne	ne	ne	<0.000759		<0.000948		<0.000883		<0.000754		<0.000865		<0.000799		<0.000736		<0.000864		<0.000801		<0.000822		<0.000771		<0.000905		<0.000733		<0.000791	
8260B	TRANS-1,3-DICHLOROPROPENE	mg/kg	ne	ne	ne	<0.00171		<0.00214		<0.00199		<0.00170		<0.00195		<0.00180		<0.00166		<0.00195		<0.00181		<0.00186		<0.00174		<0.00204		<0.00165		<0.00179	
8260B	2,2-DICHLOROPROPANE	mg/kg	ne	ne	ne	<0.000887		<0.00111		<0.00103		<0.000882		<0.00101		<0.000935		<0.000860		<0.00101		<0.000936		<0.000962		<0.000902		<0.00106		<0.000857		<0.000925	
8260B	DI-ISOPROPYL ETHER	mg/kg	2200	9400	ne	<0.000392		<0.000489		<0.000456		<0.000389		<0.000447		<0.000413		<0.000380		<0.000446		<0.000413		<0.000425		<0.000398		<0.000467		<0.000378		<0.000408	
8260B	ETHYLBENZENE	mg/kg	5.8	25	5	<0.000593		0.0238		<0.000690		<0.000589		<0.000676		0.0135		<0.000575		<0.000676		<0.000626		<0.000643		<0.000603		<0.000708		<0.000573		<0.000618	
8260B	HEXACHLORO-1,3-BUTADIENE	mg/kg	1.2	5.3	ne	<0.0142		<0.0178		<0.0165		<0.0141		<0.0162		<0.0149		<0.0138		<0.0162		<0.0150		<0.0154		<0.0144		<0.0170		<0.0137		<0.0148	
8260B	ISOPROPYLBENZENE	mg/kg	1900	9900	ne	<0.000966		0.00856		<0.00112		<0.000960		<0.00110		0.00401		<0.000936		<0.00110		<0.00102		<0.00105		<0.000982		<0.00115		<0.000932		<0.00101	
8260B	P-ISOPROPYLTOLUENE	mg/kg	ne	ne	ne	<0.00261		0.0173		<0.00303		<0.00259		<0.00297		0.00895		<0.00253		<0.00297		<0.00275		<0.00283		<0.00265		<0.00311		<0.00252		<0.00272	
8260B	2-BUTANONE (MEK)	mg/kg	27000	190000	ne	<0.0140		<0.0175		<0.0163		<0.0139		<0.0160		<0.0147		<0.0136		<0.0159		<0.0148		<0.0152		<0.0142		<0.0167		<0.0135		<0.0146	
8260B	METHYLENE CHLORIDE	mg/kg	57	1000	ne	<0.00743		<0.00928		<0.00865		<0.00738		<0.00848		<0.00783		<0.00720		<0.00846		<0.00784		<0.00805		<0.00755		<0.00887		<0.00717		<0.00775	
8260B	4-METHYL-2-PENTANONE (MIBK)	mg/kg	33000	140000	ne	<0.0112		<0.0140		<0.0130		<0.0111		<0.0128		<0.0118		<0.0109		<0.0127		<0.0118		<0.0121		<0.0114		<0.0134		<0.0108		<0.0117	
8260B	METHYL TERT-BUTYL ETHER	mg/kg	47	210	0.3	<0.000330		<0.000413		<0.000384		<0.000328		<0.000376		<0.000348		<0.000320		<0.000376		<0.000348		<0.000358		<0.000336		<0.000394		<0.000319		<0.000344	
8260B	NAPHTHALENE	mg/kg	3.8	17	51	<0.00349		0.11		<0.00406		0.00948	J	<0.00398		0.042		<0.00339		<0.00398		<0.00368		<0.00378		<0.00355		<0.00417		<0.00337		<0.00364	
8260B	N-PROPYLBENZENE	mg/kg	3800	24000	ne	<0.00132		0.0106		<0.00154		<0.00131		<0.00150		0.00734		<0.00128		<0.00150		<0.00139		<0.00143		<0.00134		<0.00158		<0.00128		<0.00138	
8260B	STYRENE	mg/kg	6000	35000	ne	<0.00306		<0.00382		<0.00356		<0.00304		<0.00348		<0.00322		<0.00296		<0.00348		<0.00322		<0.00331		<0.00311		<0.00365		<0.00295		<0.00319	
8260B	1,1,1,2-TETRACHLOROETHANE	mg/kg	2	8.8	ne	<0.000560		<0.000700		<0.000651		<0.000556		<0.000638		<0.000589		<0.000543		<0.000637		<0.000590		<0.000606		<0.000569		<0.000668		<0.000540		<0.000583	
8260B	1,1,2,2-TETRACHLOROETHANE	mg/kg	0.6	2.7	ne	<0.000436		<0.000545		<0.000508		<0.000434		<0.000498		<0.000460		<0.000423		<0.000497		<0.000461		<0.000473		<0.000444		<0.000521		<0.000421		<0.000455	
8260B	1,1,2-TRICHLOROTRIFLUOROETHANE	mg/kg	6700	28000	ne	<0.000755		<0.000944		<0.000879		<0.000751		<0.000861		<0.000796		<0.000732		<0.000860		<0.000797		<0.000819		<0.000768		<0.000901		<0.000729		<0.000788	
8260B	TETRACHLOROETHENE	mg/kg	24	100	ne	<0.000783		0.00908		<0.000912		<0.000779		<0.000894		<0.000825		<0.000760		<0.000892		<0.000827		<0.000849		<0.000796		<0.000935		<0.000756		<0.000817	
8260B	TOLUENE	mg/kg	4900	47000	9	0.00311	J	0.112		<0.00163		0.0172		0.00748		0.0848		0.00273	J	0.00388	J	0.00444	J	0.00329	J	0.00315	J	0.0028	J	0.00325	J	<0.00146	
8260B	1,2,3-TRICHLOROBENZENE	mg/kg	63	930	ne	<0.000699		<0.000875		<0.000814		<0.000695		<0.000798		<0.000736		<0.000678		<0.000797		<0.000738		<0.000758		<0.000711		<0.000835		<0.000675		<0.000729	
8260B	1,2,4-TRICHLOROBENZENE	mg/kg	24	110	ne	<0.00539		<0.00675		<0.00628		<0.00536		<0.00616		<0.00568		<0.00523		<0.00614		<0.00569		<0.00585		<0.00548		<0.00644		<0.00521		<0.00562	
8260B	1,1,1-TRICHLOROETHANE	mg/kg	8100	36000	ne	<0.000308		0.00692		<0.000358		<0.000306		<0.000350		<0.000324		<0.000298		<0.000351		<0.000325		<0.000334		<0.000313		<0.000367		<0.000297		<0.000321	
8260B	1,1,2-TRICHLOROETHANE	mg/kg	1.1	5	ne	<0.000988		<0.00124		<0.00115		<0.000982		<0.00113		<0.00104		<0.000958		<0.00113		<0.00104		<0.00107		<0.00100		<0.00118		<0.000954		<0.00103	
8260B	TRICHLOROETHENE	mg/kg	0.94	6	ne	0.0114		45.2		0.0214		0.986	*	0.00915		1.54	*	0.0196		0.0143		0.000714	J	0.00142		0.00783		<0.000534		0.0135		<0.000467	
8260B	TRICHLOROFLUOROMETHANE	mg/kg	23000	350000	ne	<0.000560		<0.000700		<0.000651		<0.000556		<0.000638		<0.000589		<0.000543		<0.000637		<0.000590		<0.000606		<0.000569		<0.000668		<0.000540		<0.000583	
8260B	1,2,3-TRICHLOROPROPANE	mg/kg	0.0051	0.11	ne	<0.00571		<0.00714		<0.00664		<0.00567		<0.00651		<0.00601		<0.00553		<0.00650		<0.00602		<0.00619		<0.00580		<0.00681		<0.00551		<0.00595	
8260B	1,2,4-TRIMETHYLBENZENE	mg/kg	300	1800	ne	<0.00130		0.108		0.00179	J	0.0102		0.00403	J	0.0577		0.00159	J	0.00192	J	<0.00137		<0.00141		0.00234	J	<0.00155		0.00196	J	<0.00135	
8260B	1,2,3-TRIMETHYLBENZENE	mg/kg	340	2000	ne	<0.00129		0.0534		<0.00150		0.00425	J	0.00161	J	0.0262		<0.00125		<0.00147		<0.00136		<0.00139		<0.00131		<0.00154		<0.00124		<0.00134	
8260B	1,3,5-TRIMETHYLBENZENE	mg/kg	270	1500	ne	<0.00121		0.0324		<0.00141		0.00309	J	<0.00137		0.0196		<0.00117		<0.00138		<0.00128		<0.00131		<0.00123		<0.00144		<0.00117		<0.00126	
8260B	VINYL CHLORIDE	mg/kg	0.059	1.7	ne	<0.000764		<0.000956		<0.000890		<0.000760		<0.000872		<0.000805		<0.000741		<0.000871		<0.000807		<0.000828		<0.000777		<0.000912		<0.000738		<0.000797	
8260B	XYLENES, TOTAL	mg/kg	580	2500	142	<0.00535		0.309		<0.00623		0.0301		0.00856		0.212		<0.00519		<0.00609		<0.00564		<0.00580		<0.00544		<0.00638		<0.00516		<0.00558	

Qualifiers - J: The identification of the analyte is acceptable; the reported value is an estimate. J3: The associated batch QC was outside the established quality control range for precision. J4: The associated batch QC was outside the established quality control range for accuracy.
* - 1,2-dichloropropane or trichloroethylene was reported at a concentration close to its regulatory screening levels in this sample. As these constituents were outside of their control limits for Precision in the field duplicate pair, their analytical results are considered qualified and may not be acceptable for comparison to the screening levels.
1 - Environmental Protection Agency Regional Screening Levels for Residential soil (May 2018; Target Hazard Quotient=1).
2 - Environmental Protection Agency Regional Screening Levels for Industrial soils (May 2018; Target Hazard Quotient=1).
3 - Utah Department of Environmental Quality Initial Screening Level for petroleum hydrocarbons in soil. bromodi
Shaded value reported above laboratory reporting limit. *Italized values* exceed Screening Level.
ne - not established. mg/kg - milligrams per kilogram.

Table C2 - Metals in Soil
Schovaers Electronics Property - 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. 61177082

Lab Sample ID					L995461-01		L995461-02		L995461-04		L995461-05		L995461-07		L995461-08		L995461-09		L995461-10		L995461-12		L995461-13		L995461-15		L995461-16		L995461-18		L995461-19		L995461-21		L995461-22		L995461-23		L995461-24	
Client Sample ID					**SE-SB-21 (3)**		**SE-SB-21 (7)**		**SE-SB-22 (3)**		**SE-SB-22 (7)**		**SE-SB-24 (3)**		**SE-SB-24 (7)**		**SE-SB-23 (3)**		**SE-SB-23 (10)**		**SE-SB-20 (3)**		**SE-SB-20 (11)**		**SE-SB-19 (4)**		**SE-SB-19 (8)**		**SE-SB-18 (3)**		**SE-SB-18 (8)**		**SE-SB-16 (2.5)**		**SE-SB-16 (5)**		**SE-SB-17 (2.5)**		**SE-SB-17 (5)**	
Date Collected					05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018	
Method	**Analyte**	**Units**	**EPA RSL - Residential[1]**	**EPA RSL - Industrial[2]**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**
3060A/7196A	**CHROMIUM,HEXAVALENT**	mg/kg	0.3	6.3	*<0.716*		*<0.837*		*<0.834*		*<0.712*		*<0.692*		*<0.747*	J3 J6 O1	*<0.694*		0.918	J	*<0.756*		*<0.776*		1.5	J	0.855	J	*<0.692*		*<0.747*		*<0.702*		1.16	J	0.844	J	*<0.779*	
6010B	**ANTIMONY**	mg/kg	31	470	<0.839	J6	<0.981		<0.977		<0.834		<0.811		<0.875		<0.814		<0.956		<0.886		<0.910		<0.853		<1.00		<0.810		<0.875									
6010B	**ARSENIC**	mg/kg	0.68	3	5.74		52.9		8.78		6.05		3.46		20.8		3.63		21.4		11.9		9.83		17.5		5.62		6.25		1.6	J								
6010B	**BERYLLIUM**	mg/kg	160	2300	0.622		0.78		1.38		0.612		0.353		0.666		0.351		1.24		0.457		0.524		0.544		1.04		0.335		0.135	J								
6010B	**CADMIUM**	mg/kg	71	980	1.27		2.53		0.331	J	0.819		0.43	J	1.11		0.378	J	1.05		0.278	J	0.44	J	2.16		0.597	J	0.303	J	0.294	J								
6010B	**CHROMIUM**	mg/kg	120000	1800000	15		19.3		31.1		16.3		14		15.1		20.3		28.2		14.2		15.4		17.7		23.4		11.6		6.72									
6010B	**COPPER**	mg/kg	3100	47000	13.7		101		66.5		25.6		11.5		112		9.94		64.3		13.9		34.6		49		55.5		10.3		10.8									
6010B	**LEAD**	mg/kg	400	800	51.8		508		51.5		143		36.5		295		30.6		62.8		11.6		19.2		299		29.7		12.4		7.31									
6010B	**NICKEL**	mg/kg	1500	22000	17.1		10.6		25.4		11		9.15		9.93		8.44		39.4		11.2		12.9		10.1		21.9		8.82		5.03									
6010B	**SELENIUM**	mg/kg	390	5800	1.75	J	1.16	J	<0.964		<0.823		<0.800		1.06	J	<0.803		1.87	J	<0.874		2.53		<0.842		<0.988		1.07	J	0.944	J								
6010B	**SILVER**	mg/kg	390	5800	<0.313		0.439	J	<0.365		<0.311		<0.303		0.778	J	<0.304		<0.357		<0.331		<0.340		<0.319		<0.374		<0.303		<0.327									
6010B	**THALLIUM**	mg/kg	0.78	12	<0.727		*<0.850*		*<0.847*		<0.723		<0.703		<0.759		<0.705		*<0.828*		<0.768		*<0.788*		<0.739		*<0.868*		<0.702		<0.758									
6010B	**ZINC**	mg/kg	23000	350000	94	J6	280		126		99.5		52.4		135		41.1		111		31.4		49.1		210		92		33.9		18.5									
7471A	**MERCURY**	mg/kg	11	46	0.0836		1.42		0.0769		0.674		0.0278		0.991		0.0509		0.026		0.0155	J	0.0122	J	0.26		0.0163	J	0.0189	J	0.00652	J								
9045D	**pH**	su	ne	ne	8.43	T8	7.64	T8	8.69	T8	10.7	T8	7.98	T8	7.61	T8	8.63	T8	8.18	T8	8.71	T8	8.37	T8	8.01	T8	8.19	T8	8.48	T8	8.31	T8								

Qualifiers: J: The identification of the analyte is acceptable; the reported value is an estimate. J3: The associated batch QC was outside the established quality control range for precision. J6: The sample matrix interfered with the ability to make any accurate determination; spike value is low. O1: The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference. P1: RPD value not applicable for sample concentrations less than 5 times the reporting limit. T8: Sample(s) received past/too close to holding time expiration.
1 - Environmental Protection Agency Regional Screening Levels for Residential soil (June 2018; Target Hazard Quotient=1).
2 - Environmental Protection Agency Regional Screening Levels for Industrial soils (June 2018; Target Hazard Quotient=1).
Shaded value reported above laboratory reporting limit. *Italized values* indicate reporting limit above Screening Level.
ne - not established. mg/kg - milligrams per kilogram. su - standard unit.

Table C3 - VOCs in Groundwater
Schovaers Electronics Property - 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. 61177082

Lab Sample ID									L995461-03		L995461-06		L995461-11		L995461-14		L995461-17		L995461-20		L995461-25	
Client Sample ID									**SE-SB-21**		**SE-SB-22**		**SE-SB-23**		**SE-SB-20**		**SE-SB-19**		**SE-SB-18**		**SE-SB-17**	
Date Collected									05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018	
Method	**Analyte**	**Units**	**EPA RSL Tapwater[1]**	**EPA MCL[2]**	**EPA VISL Residential Target Ground Water[3]**	**EPA VISL Commercial Target Ground Water[4]**	**UGWQPS[5]**	**UDEQ ISL[6]**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**
8260B	ACETONE	mg/l	14	ne	22500	94500	ne	ne	<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100	
8260B	ACROLEIN	mg/l	0.000042	ne	0.00418	0.0176	ne	ne	<0.00887		<0.00887		<0.00887		<0.00887		<0.00887		<0.00887		<0.00887	
8260B	ACRYLONITRILE	mg/l	0.000052	ne	0.00732	0.032	ne	ne	<0.00187		<0.00187		<0.00187		<0.00187		<0.00187		<0.00187		<0.00187	
8260B	BENZENE	mg/l	0.00046	0.005	0.00159	0.00693	0.005	0.005	<0.000331		<0.000331		<0.000331		<0.000331		<0.000331		<0.000331		<0.000331	
8260B	BROMOBENZENE	mg/l	0.062	ne	0.62	2.6	ne	ne	<0.000352		<0.000352		<0.000352		<0.000352		<0.000352		<0.000352		<0.000352	
8260B	BROMODICHLOROMETHANE	mg/l	0.00013	0.08	0.000876	0.00382	ne	ne	<0.000380		<0.000380		<0.000380		<0.000380		<0.000380		<0.000380		<0.000380	
8260B	BROMOFORM	mg/l	0.0033	0.08	0.117	0.51	ne	ne	<0.000469		<0.000469		<0.000469		<0.000469		<0.000469		<0.000469		<0.000469	
8260B	BROMOMETHANE	mg/l	0.0075	ne	0.0174	0.073	ne	ne	<0.000866		<0.000866		<0.000866		<0.000866		<0.000866		<0.000866		<0.000866	
8260B	N-BUTYLBENZENE	mg/l	1	ne	ne	ne	ne	ne	<0.000361		<0.000361		<0.000361		<0.000361		<0.000361		<0.000361		<0.000361	
8260B	SEC-BUTYLBENZENE	mg/l	2	ne	ne	ne	ne	ne	<0.000365		<0.000365		<0.000365		<0.000365		<0.000365		<0.000365		<0.000365	
8260B	TERT-BUTYLBENZENE	mg/l	0.69	ne	ne	ne	ne	ne	<0.000399		<0.000399		<0.000399		<0.000399		<0.000399		<0.000399		<0.000399	
8260B	CARBON TETRACHLORIDE	mg/l	0.00046	0.005	0.000415	0.00181	0.005	ne	<0.000379		<0.000379		<0.000379		<0.000379		<0.000379		<0.000379		<0.000379	
8260B	CHLOROBENZENE	mg/l	0.078	0.1	0.41	1.72	0.1	ne	<0.000348		<0.000348		<0.000348		<0.000348		<0.000348		<0.000348		<0.000348	
8260B	CHLORODIBROMOMETHANE	mg/l	0.00087	0.08	ne	ne	ne	ne	<0.000327		<0.000327		<0.000327		<0.000327		<0.000327		<0.000327		<0.000327	
8260B	CHLOROETHANE	mg/l	21	ne	ne	ne	ne	ne	<0.000453		<0.000453		<0.000453		<0.000453		<0.000453		<0.000453		<0.000453	
8260B	2-CHLOROETHYL VINYL ETHER	mg/l		ne	ne	ne	ne	ne	<0.00301		<0.00301		<0.00301		<0.00301		<0.00301		<0.00301		<0.00301	
8260B	CHLOROFORM	mg/l	0.00022	0.08	0.000814	0.00355	ne	ne	<0.000324		<0.000324		<0.000324		<0.000324		<0.000324		<0.000324		<0.000324	
8260B	CHLOROMETHANE	mg/l	0.19	ne	0.26	1.09	ne	ne	<0.000276		<0.000276		<0.000276		<0.000276		<0.000276		<0.000276		<0.000276	
8260B	2-CHLOROTOLUENE	mg/l	0.24	ne	ne	ne	ne	ne	<0.000375		<0.000375		<0.000375		<0.000375		<0.000375		<0.000375		<0.000375	
8260B	4-CHLOROTOLUENE	mg/l	0.25	ne	ne	ne	ne	ne	<0.000351		<0.000351		<0.000351		<0.000351		<0.000351		<0.000351		<0.000351	
8260B	1,2-DIBROMO-3-CHLOROPROPANE	mg/l	0.00000033	0.0002	0.0000281	0.00034	0.0002	ne	<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133		<0.00133	
8260B	1,2-DIBROMOETHANE	mg/l	0.0000075	0.00005	0.000176	0.000769	0.00005	ne	<0.000381		<0.000381		<0.000381		<0.000381		<0.000381		<0.000381		<0.000381	
8260B	DIBROMOMETHANE	mg/l	0.0083	ne	0.124	0.521	ne	ne	<0.000346		<0.000346		<0.000346		<0.000346		<0.000346		<0.000346		<0.000346	
8260B	1,2-DICHLOROBENZENE	mg/l	0.3	0.6	2.66	11.2	0.6	ne	<0.000349		<0.000349		<0.000349		<0.000349		<0.000349		<0.000349		<0.000349	
8260B	1,3-DICHLOROBENZENE	mg/l	ne	ne	ne	ne	ne	ne	<0.000220		<0.000220		<0.000220		<0.000220		<0.000220		<0.000220		<0.000220	
8260B	1,4-DICHLOROBENZENE	mg/l	0.00048	0.075	0.00259	0.0113	0.075	ne	<0.000274		<0.000274		<0.000274		<0.000274		<0.000274		<0.000274		<0.000274	
8260B	DICHLORODIFLUOROMETHANE	mg/l	0.2	ne	0.00744	0.0312	ne	ne	<0.000551		<0.000551		<0.000551		<0.000551		<0.000551		<0.000551		<0.000551	
8260B	1,1-DICHLOROETHANE	mg/l	0.0028	ne	0.00764	0.0334	ne	ne	<0.000259		<0.000259		<0.000259		<0.000259		<0.000259		<0.000259		<0.000259	
8260B	1,2-DICHLOROETHANE	mg/l	0.00017	0.005	0.00224	0.00978	0.005	ne	<0.000361		<0.000361		<0.000361		<0.000361		<0.000361		<0.000361		<0.000361	
8260B	1,1-DICHLOROETHENE	mg/l	0.28	0.007	0.195	0.821	0.007	ne	<0.000398		<0.000398		<0.000398		<0.000398		<0.000398		<0.000398		<0.000398	
8260B	CIS-1,2-DICHLOROETHENE	mg/l	0.036	0.07	ne	ne	0.07	ne	<0.000260		<0.000260		<0.000260		<0.000260		<0.000260		<0.000260		<0.000260	
8260B	TRANS-1,2-DICHLOROETHENE	mg/l	0.36	0.1	ne	ne	0.1	ne	<0.000396		<0.000396		<0.000396		<0.000396		<0.000396		<0.000396		<0.000396	
8260B	1,2-DICHLOROPROPANE	mg/l	0.00085	0.005	0.00658	0.0287	0.005	ne	<0.000306		<0.000306		<0.000306		<0.000306		<0.000306		<0.000306		<0.000306	
8260B	1,1-DICHLOROPROPENE	mg/l	ne	ne	ne	ne	ne	ne	<0.000352		<0.000352		<0.000352		<0.000352		<0.000352		<0.000352		<0.000352	
8260B	1,3-DICHLOROPROPANE	mg/l	0.37	ne	ne	ne	ne	ne	<0.000366		<0.000366		<0.000366		<0.000366		<0.000366		<0.000366		<0.000366	
8260B	CIS-1,3-DICHLOROPROPENE	mg/l	ne	ne	ne	ne	ne	ne	<0.000418		<0.000418		<0.000418		<0.000418		<0.000418		<0.000418		<0.000418	
8260B	TRANS-1,3-DICHLOROPROPENE	mg/l	ne	ne	ne	ne	ne	ne	<0.000419		<0.000419		<0.000419		<0.000419		<0.000419		<0.000419		<0.000419	
8260B	2,2-DICHLOROPROPANE	mg/l	ne	ne	ne	ne	ne	ne	<0.000321		<0.000321		<0.000321		<0.000321		<0.000321		<0.000321		<0.000321	
8260B	DI-ISOPROPYL ETHER	mg/l	1.5	ne	6.97	29.3	ne	ne	<0.000320		<0.000320		<0.000320		<0.000320		<0.000320		<0.000320		<0.000320	
8260B	ETHYLBENZENE	mg/l	0.0015	0.7	0.00349	0.0152	0.7	0.7	<0.000384		<0.000384		<0.000384		<0.000384		<0.000384		<0.000384		<0.000384	
8260B	HEXACHLORO-1,3-BUTADIENE	mg/l	0.00014	ne	0.000303	0.00132	ne	ne	<0.000256		<0.000256		<0.000256		<0.000256		<0.000256		<0.000256		<0.000256	
8260B	ISOPROPYLBENZENE	mg/l	0.45	ne	0.887	3.73	ne	ne	<0.000326		<0.000326		<0.000326		<0.000326		<0.000326		<0.000326		<0.000326	
8260B	P-ISOPROPYLTOLUENE	mg/l	ne	ne	ne	ne	ne	ne	<0.000350		<0.000350		<0.000350		<0.000350		<0.000350		<0.000350		<0.000350	
8260B	2-BUTANONE (MEK)	mg/l	5.6	ne	2240	9410	ne	ne	<0.00393		<0.00393		<0.00393		<0.00393		<0.00393		<0.00393		<0.00393	
8260B	METHYLENE CHLORIDE	mg/l	0.011	0.005	0.763	9.23	0.005	ne	<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100	
8260B	4-METHYL-2-PENTANONE (MIBK)	mg/l	6.3	ne	555	2330	ne	ne	<0.00214		<0.00214		<0.00214		<0.00214		<0.00214		<0.00214		<0.00214	
8260B	METHYL TERT-BUTYL ETHER	mg/l	0.014	ne	0.45	1.97	ne	0.2	<0.000367		<0.000367		<0.000367		<0.000367		<0.000367		<0.000367		<0.000367	
8260B	NAPHTHALENE	mg/l	0.00017	ne	0.00459	0.0201	ne	0.7	<0.00100	J3	<0.00100	J3	<0.00100	J3	<0.00100	J3	<0.00100	J3	<0.00100	J3	<0.00100	J3
8260B	N-PROPYLBENZENE	mg/l	0.66	ne	2.43	10.2	ne	ne	<0.000349		<0.000349		<0.000349		<0.000349		<0.000349		<0.000349		<0.000349	
8260B	STYRENE	mg/l	1.2	0.1	9.28	39	0.1	ne	<0.000307		<0.000307		<0.000307		<0.000307		<0.000307		<0.000307		<0.000307	
8260B	1,1,1,2-TETRACHLOROETHANE	mg/l	0.00057	ne	0.00371	0.0162	ne	ne	<0.000385		<0.000385		<0.000385		<0.000385		<0.000385		<0.000385		<0.000385	
8260B	1,1,2,2-TETRACHLOROETHANE	mg/l	0.000076	ne	0.00323	0.0141	ne	ne	<0.000130		<0.000130		<0.000130		<0.000130		<0.000130		<0.000130		<0.000130	
8260B	1,1,2-TRICHLOROTRIFLUOROETHANE	mg/l	10	ne	0.242	1.02	ne	ne	<0.000303		<0.000303		<0.000303		<0.000303		<0.000303		<0.000303		<0.000303	
8260B	TETRACHLOROETHENE	mg/l	0.011	0.005	0.0149	0.0652	0.005	ne	<0.000372		<0.000372		<0.000372		<0.000372		<0.000372		<0.000372		<0.000372	
8260B	TOLUENE	mg/l	1.1	1	19.2	80.7	1	1	<0.000412		<0.000412		<0.000412		<0.000412		<0.000412		<0.000412		<0.000412	
8260B	1,2,3-TRICHLOROBENZENE	mg/l	0.007	ne	ne	ne	ne	ne	<0.000230	J3	<0.000230	J3	<0.000230	J3	<0.000230	J3	<0.000230	J3	<0.000230	J3	<0.000230	J3
8260B	1,2,4-TRICHLOROBENZENE	mg/l	0.0012	0.07	0.0359	0.151	0.07	ne	<0.000355		<0.000355		<0.000355		<0.000355		<0.000355		<0.000355		<0.000355	
8260B	1,1,1-TRICHLOROETHANE	mg/l	8	0.2	7.42	31.1	0.2	ne	<0.000319		<0.000319		<0.000319		<0.000319		<0.000319		<0.000319		<0.000319	
8260B	1,1,2-TRICHLOROETHANE	mg/l	0.00028	0.005	0.00521	0.0228	0.005	ne	<0.000383		<0.000383		<0.000383		<0.000383		<0.000383		<0.000383		<0.000383	
8260B	TRICHLOROETHENE	mg/l	0.00049	0.005	0.00119	0.00743	0.005	ne	0.0766		0.00888		0.0107		0.000834	J	<0.000398		0.00251		0.0195	
8260B	TRICHLOROFLUOROMETHANE	mg/l	5.2	ne	ne	ne	ne	ne	<0.00120		<0.00120		<0.00120		<0.00120		<0.00120		<0.00120		<0.00120	
8260B	1,2,3-TRICHLOROPROPANE	mg/l	0.00000075	ne	0.0223	0.0937	ne	ne	<0.000807		<0.000807		<0.000807		<0.000807		<0.000807		<0.000807		<0.000807	
8260B	1,2,4-TRIMETHYLBENZENE	mg/l	0.056	ne	0.248	1.04	ne	ne	<0.000373		<0.000373		<0.000373		<0.000373		<0.000373		<0.000373		<0.000373	
8260B	1,2,3-TRIMETHYLBENZENE	mg/l	0.055	ne	0.351	1.47	ne	ne	<0.000321		<0.000321		<0.000321		<0.000321		<0.000321		<0.000321		<0.000321	
8260B	1,3,5-TRIMETHYLBENZENE	mg/l	0.06	ne	0.175	0.733	ne	ne	<0.000387		<0.000387		<0.000387		<0.000387		<0.000387		<0.000387		<0.000387	
8260B	VINYL CHLORIDE	mg/l	0.000019	0.002	0.000147	0.00245	0.002	ne	<0.000259		<0.000259		<0.000259		<0.000259		<0.000259		<0.000259		<0.000259	
8260B	XYLENES, TOTAL	mg/l	0.19	10	0.385	1.62	10	10	<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106		<0.00106	

Qualifiers: J: The identification of the analyte is acceptable; the reported value is an estimate. J3: The associated batch QC was outside the established quality control range for precision. J4: The associated batch QC was outside the established quality control range for accuracy.
1 - Environmental Protection Agency Regional Screening Levels for Tapwater (May 2018; Target Hazard Quotient=1).
2 - Environmental Protection Agency Maximum Contaminant Level (May 2018; Target Hazard Quotient=1).
3 - Environmental Protection Agency Residential Target Groundwater Concentration (May 2018; Target Hazard Quotient=1).
4 -Environmental Protection Agency Industrial Target Groundwater Concentration (May 2018; Target Hazard Quotient=1).
5 - Utah Ground Water Quality Protection Standards.
6 - Utah Department of Environmental Quality Initial Screening Level for groundwater.
Shaded value reported above laboratory reporting limit.
ne - not established. mg/l - milligrams per liter.

Table C4 - Dissolved Metals in Groundwater
Schovaers Electronics Property - 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. 61177082

Lab Sample ID						L995461-03		L995461-06		L995461-11		L995461-14		L995461-17		L995461-20		L995461-25	
Client Sample ID						**SE-SB-21**		**SE-SB-22**		**SE-SB-23**		**SE-SB-20**		**SE-SB-19**		**SE-SB-18**		**SE-SB-17**	
Date Collected						05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018		05/17/2018	
Method	**Analyte**	**Units**	**EPA RSL Tapwater[1]**	**EPA MCL[2]**	**UGWQPS[3]**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**
6010B	**BERYLLIUM,DISSOLVED**	mg/l	0.025	0.004	0.004	<0.000700		<0.000700		<0.000700		<0.000700		<0.000700		<0.000700		<0.000700	
6010B	**CADMIUM,DISSOLVED**	mg/l	0.0092	0.005	0.005	<0.000700		<0.000700		<0.000700		<0.000700		<0.000700		<0.000700		<0.000700	
6010B	**CHROMIUM,DISSOLVED**	mg/l	ne	0.1	0.1	<0.00140		<0.00140		<0.00140		0.00164	J	<0.00140		<0.00140		<0.00140	
6010B	**COPPER,DISSOLVED**	mg/l	0.8	1.3	1.3	<0.00530		<0.00530		<0.00530		<0.00530		<0.00530		<0.00530		<0.00530	
6010B	**NICKEL,DISSOLVED**	mg/l	0.39	ne	ne	<0.00490		<0.00490		0.00531	J	<0.00490		0.0059	J	<0.00490		0.00707	J
6010B	**SELENIUM,DISSOLVED**	mg/l	0.1	0.05	0.05	<0.00740		<0.00740		<0.00740		<0.00740		<0.00740		<0.00740		<0.00740	
6010B	**SILVER,DISSOLVED**	mg/l	0.094	ne	0.1	<0.00280		<0.00280		<0.00280		<0.00280		<0.00280		<0.00280		<0.00280	
6010B	**ZINC,DISSOLVED**	mg/l	6	ne	5	0.0155	J	0.0193	J	0.0225	J	0.00948	J	0.0219	J	0.0167	J	0.0203	J
6020	**ANTIMONY,DISSOLVED**	mg/l	0.0078	0.006	0.006	<0.000754		0.000851	J	<0.000754		<0.000754		<0.000754		<0.000754		<0.000754	
6020	**ARSENIC,DISSOLVED**	mg/l	0.000052	0.01	0.05	0.000637	J	0.00111	J	0.000613	J	0.000283	J	<0.000250		0.00376		0.00114	J
6020	**LEAD,DISSOLVED**	mg/l	0.015	0.015	0.015	<0.000240		<0.000240		<0.000240		<0.000240		0.000388	J	<0.000240		0.000256	J
6020	**THALLIUM,DISSOLVED**	mg/l	0.0002	0.002	0.002	<0.000190		<0.000190		<0.000190		<0.000190		<0.000190		<0.000190		<0.000190	
7199	**HEXAVALENT CHROMIUM-LOW LEVEL**	mg/l	0.000035	0.1[4]	ne	0.0000857		0.000217		0.0000572	J J6	0.000096		0.000116		<0.0000200		0.0000234	J
7470A	**MERCURY,DISSOLVED**	mg/l	0.00063	0.002	0.002	<0.0000490		<0.0000490		<0.0000490		<0.0000490		<0.0000490		<0.0000490		<0.0000490	
na	**pH - field measured**	su	ne	ne	ne	7		7		7		7		7		7		7	

Qualifiers - J: The identification of the analyte is acceptable; the reported value is an estimate. J5: The sample matrix interfered with the ability to make any accurate determination; spike value is high. J6: The sample matrix interfered with the ability to make any accurate determination; spike value is low.
1 - Environmental Protection Agency Regional Screening Levels for Tapwater (May 2018; Target Hazard Quotient=1).
2 - Environmental Protection Agency Maximum Contaminant Level (May 2018; Target Hazard Quotient=1).
3 - Utah Ground Water Quality Protection Standards.
4 - The MCL for hexavalent chromium is based on the dissolved total chromium MCL, which assumes all of the chromium is hexavalent.
Shaded value reported above laboratory reporting limit.
ne - not established. mg/l - milligrams per liter. su - standard unit.

Table C5 - Sub-slab Vapor Sample Results
Schovaers Electronics Property - 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. 61177082

Lab Sample ID					L995391-01		L995391-02		L995391-03		L995391-04	
Client Sample ID					**SE-VP-3**		**SE-VP-4**		**SE-VP-1**		**SE-VP-2**	
Date Collected					05/18/2018		05/18/2018		05/18/2018		05/18/2018	
Method	**Analyte**	**Units**	**EPA VISL - Residential[1]**	**EPA VISL - Industrial[2]**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**
TO-15	**ACETONE**	ug/m3	1070000	4510000	233		35.7		312	E	24.3	
TO-15	**ALLYL CHLORIDE**	ug/m3	15.6	68.1	<1.25		<1.25		<1.25		<1.25	
TO-15	**BENZENE**	ug/m3	12	52.4	<1.28		<1.28		<1.28		<1.28	
TO-15	**BENZYL CHLORIDE**	ug/m3	1.91	8.34	<2.08		<2.08		<2.08		<2.08	
TO-15	**BROMODICHLOROMETHANE**	ug/m3	2.53	11	<2.68		<2.68		<2.68		<2.68	
TO-15	**BROMOFORM**	ug/m3	85.1	372	<12.4		<12.4		<12.4		<12.4	
TO-15	**BROMOMETHANE**	ug/m3	174	730	<1.55		<1.55		<1.55		<1.55	
TO-15	**1,3-BUTADIENE**	ug/m3	3.12	13.6	<8.85		<8.85		<8.85		<8.85	
TO-15	**CARBON DISULFIDE**	ug/m3	24300	102000	<1.24		<1.24		<1.24		<1.24	
TO-15	**CARBON TETRACHLORIDE**	ug/m3	15.6	68.1	<2.52		<2.52		<2.52		<2.52	
TO-15	**CHLOROBENZENE**	ug/m3	1740	7300	<1.85		<1.85		<1.85		<1.85	
TO-15	**CHLOROETHANE**	ug/m3	348000	1460000	<1.06		<1.06		<1.06		<1.06	
TO-15	**CHLOROFORM**	ug/m3	4.07	17.8	<1.95		<1.95		<1.95		<1.95	
TO-15	**CHLOROMETHANE**	ug/m3	3130	13100	<0.826		<0.826		<0.826		<0.826	
TO-15	**2-CHLOROTOLUENE**	ug/m3	ne	ne	<2.06		<2.06		<2.06		<2.06	
TO-15	**CYCLOHEXANE**	ug/m3	209000	876000	<1.38		<1.38		<1.38		<1.38	
TO-15	**CHLORODIBROMOMETHANE**	ug/m3	ne	ne	<3.40		<3.40		<3.40		<3.40	
TO-15	**1,2-DIBROMOETHANE**	ug/m3	0.156	0.681	<3.08		<3.08		<3.08		<3.08	
TO-15	**1,2-DICHLOROBENZENE**	ug/m3	6950	29200	<2.40		<2.40		<2.40		<2.40	
TO-15	**1,3-DICHLOROBENZENE**	ug/m3	ne	ne	<2.40		<2.40		<2.40		<2.40	
TO-15	**1,4-DICHLOROBENZENE**	ug/m3	8.51	37.2	<2.40		<2.40		<2.40		<2.40	
TO-15	**1,2-DICHLOROETHANE**	ug/m3	3.6	15.7	<1.62		<1.62		<1.62		<1.62	
TO-15	**1,1-DICHLOROETHANE**	ug/m3	58.5	256	<1.60		<1.60		<1.60		<1.60	
TO-15	**1,1-DICHLOROETHENE**	ug/m3	6950	29200	<1.59		<1.59		<1.59		<1.59	
TO-15	**CIS-1,2-DICHLOROETHENE**	ug/m3	ne	ne	<1.59		<1.59		<1.59		<1.59	
TO-15	**TRANS-1,2-DICHLOROETHENE**	ug/m3	ne	ne	<1.59		<1.59		<1.59		<1.59	
TO-15	**1,2-DICHLOROPROPANE**	ug/m3	25.3	110	<1.85		<1.85		<1.85		<1.85	
TO-15	**CIS-1,3-DICHLOROPROPENE**	ug/m3	ne	ne	<1.82		<1.82		<1.82		<1.82	
TO-15	**TRANS-1,3-DICHLOROPROPENE**	ug/m3	ne	ne	<1.82		<1.82		<1.82		<1.82	
TO-15	**1,4-DIOXANE**	ug/m3	18.7	81.8	6.34		<1.44		<1.44		<1.44	
TO-15	**ETHANOL**	ug/m3	ne	ne	52.9		38.4		138		40	
TO-15	**ETHYLBENZENE**	ug/m3	37.4	164	11		<1.73		1.9		<1.73	
TO-15	**4-ETHYLTOLUENE**	ug/m3	ne	ne	14.6		4.44		4.97		3.86	
TO-15	**TRICHLOROFLUOROMETHANE**	ug/m3	ne	ne	<2.25		<2.25		<2.25		<2.25	
TO-15	**DICHLORODIFLUOROMETHANE**	ug/m3	ne	ne	<1.98		1.98		<1.98		2	
TO-15	**1,1,2-TRICHLOROTRIFLUOROETHANE**	ug/m3	ne	ne	<3.07		<3.07		<3.07		<3.07	
TO-15	**1,2-DICHLOROTETRAFLUOROETHANE**	ug/m3	ne	ne	<2.80		<2.80		<2.80		<2.80	
TO-15	**HEPTANE**	ug/m3	13900	58400	1.79		<1.64		1.99		1.71	
TO-15	**HEXACHLORO-1,3-BUTADIENE**	ug/m3	4.25	18.6	<13.5		<13.5		<13.5		<13.5	
TO-15	**N-HEXANE**	ug/m3	24300	102000	<1.41		<1.41		<1.41		<1.41	
TO-15	**ISOPROPYLBENZENE**	ug/m3	13900	58400	14.5		<1.97		<1.97		<1.97	
TO-15	**METHYLENE CHLORIDE**	ug/m3	3380	40900	7.01		2.94		1.98		2.04	
TO-15	**METHYL BUTYL KETONE**	ug/m3	1040	4380	11.2		<10.2		<10.2		<10.2	
TO-15	**2-BUTANONE (MEK)**	ug/m3	174000	730000	5190		20.8		43.4		<7.37	
TO-15	**4-METHYL-2-PENTANONE (MIBK)**	ug/m3	104000	438000	137		<10.2		<10.2		<10.2	
TO-15	**METHYL METHACRYLATE**	ug/m3	24300	102000	<1.64		<1.64		<1.64		<1.64	
TO-15	**METHYL TERT-BUTYL ETHER**	ug/m3	360	1570	<1.44		<1.44		<1.44		<1.44	
TO-15	**NAPHTHALENE**	ug/m3	2.75	12	24.4		<6.60		<6.60		7.24	
TO-15	**2-PROPANOL**	ug/m3	6950	29200	49.3		36.5		205		55.4	
TO-15	**PROPENE**	ug/m3	104000	438000	3.28		<1.38		<1.38		<1.38	
TO-15	**STYRENE**	ug/m3	34800	146000	<1.70		<1.70		<1.70		<1.70	
TO-15	**1,1,2,2-TETRACHLOROETHANE**	ug/m3	1.61	7.05	<2.75		<2.75		<2.75		<2.75	
TO-15	**TETRACHLOROETHENE**	ug/m3	360	1570	<2.72		<2.72		<2.72		<2.72	
TO-15	**TETRAHYDROFURAN**	ug/m3	69500	292000	11.7		5.82		5.51		4.04	
TO-15	**TOLUENE**	ug/m3	174000	730000	15		2.73		2.71		2.07	
TO-15	**1,2,4-TRICHLOROBENZENE**	ug/m3	69.5	292	<9.33		<9.33		<9.33		<9.33	
TO-15	**1,1,1-TRICHLOROETHANE**	ug/m3	174000	730000	<2.18		3.55		6.59		<2.18	
TO-15	**1,1,2-TRICHLOROETHANE**	ug/m3	5.85	25.6	<2.18		<2.18		<2.18		<2.18	
TO-15	**TRICHLOROETHENE**	ug/m3	15.9	99.7	3050		1070		498		17.1	
TO-15	**1,2,4-TRIMETHYLBENZENE**	ug/m3	2090	8760	59.6		6.62		6.83		5.43	
TO-15	**1,3,5-TRIMETHYLBENZENE**	ug/m3	2090	8760	21.4		2.35		2.57		<1.96	
TO-15	**2,2,4-TRIMETHYLPENTANE**	ug/m3	ne	ne	<1.87		<1.87		<1.87		<1.87	
TO-15	**VINYL CHLORIDE**	ug/m3	5.59	92.9	<1.02		<1.02		<1.02		<1.02	
TO-15	**VINYL BROMIDE**	ug/m3	2.92	12.8	<1.75		<1.75		<1.75		<1.75	
TO-15	**VINYL ACETATE**	ug/m3	6950	29200	<1.41		<1.41		<1.41		<1.41	
TO-15	**M&P-XYLENE**	ug/m3	3480	14600	96.3		7.68		8.83		6.84	
TO-15	**O-XYLENE**	ug/m3	3480	14600	27.9		2.9		3.3		2.58	
TO-15	**1,1-DIFLUOROETHANE**	ug/m3	1390000	5840000	2.44		2.12		<1.08		<1.08	

Qualifiers - E: The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
1 - Environmental Protection Agency Residential Vapor Instrusion Screening Level (May 2018; Target Hazard Quotient=1).
2 - Environmental Protection Agency Industrial Vapor Instrusion Screening Level (May 2018; Target Hazard Quotient=1).
Shaded value exceeds laboratory reporting limit.
ug/m3 - micrograms per meter cubed. ne - not established

Table C6 - VOCs in Soil Duplicate Pair
Schovaers Electronics Property - 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. 61177082

			Duplicate Pair						QA/QC Goals	
Lab Sample ID			L995461-08			L995461-28				
Client Sample ID			**SE-SB-24 (7)**			**SE-SB-34 (7)**				
Date Collected			05/17/2018			05/17/2018				
Method	**Analyte**	**Units**	**Result**	**Q[1]**	**RDL[2]**	**Result**	**Q[1]**	**RDL[2]**	**RPD[3]**	**RDL Evaluation[4]**
8260B	ACETONE	mg/kg	0.0417	J3	0.0295	<0.0382	J4	0.0382		<2xRDL
8260B	ACRYLONITRILE	mg/kg	<0.0147		0.0147	<0.0191		0.0191		<2xRDL
8260B	BENZENE	mg/kg	0.0103		0.00118	0.0694		0.00153	**148%**	
8260B	BROMOBENZENE	mg/kg	<0.0147		0.0147	<0.0191		0.0191		<2xRDL
8260B	BROMODICHLOROMETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	BROMOFORM	mg/kg	<0.0295		0.0295	<0.0382		0.0382		<2xRDL
8260B	BROMOMETHANE	mg/kg	<0.0147		0.0147	<0.0191		0.0191		<2xRDL
8260B	N-BUTYLBENZENE	mg/kg	<0.0147		0.0147	<0.0191		0.0191		<2xRDL
8260B	SEC-BUTYLBENZENE	mg/kg	<0.0147		0.0147	<0.0191		0.0191		<2xRDL
8260B	TERT-BUTYLBENZENE	mg/kg	0.00191	J	0.00589	<0.00764		0.00764		<2xRDL
8260B	CARBON TETRACHLORIDE	mg/kg	<0.00589		0.00589	<0.00764		0.00764		<2xRDL
8260B	CHLOROBENZENE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	CHLORODIBROMOMETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	CHLOROETHANE	mg/kg	<0.00589		0.00589	<0.00764		0.00764		<2xRDL
8260B	CHLOROFORM	mg/kg	0.00185	J	0.00295	<0.00382		0.00382		<2xRDL
8260B	CHLOROMETHANE	mg/kg	<0.0147		0.0147	<0.0191		0.0191		<2xRDL
8260B	2-CHLOROTOLUENE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	4-CHLOROTOLUENE	mg/kg	<0.00589	J4	0.00589	<0.00764		0.00764		<2xRDL
8260B	1,2-DIBROMO-3-CHLOROPROPANE	mg/kg	<0.0295		0.0295	<0.0382		0.0382		<2xRDL
8260B	1,2-DIBROMOETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	DIBROMOMETHANE	mg/kg	<0.00589		0.00589	<0.00764		0.00764		<2xRDL
8260B	1,2-DICHLOROBENZENE	mg/kg	<0.00589		0.00589	<0.00764		0.00764		<2xRDL
8260B	1,3-DICHLOROBENZENE	mg/kg	<0.00589		0.00589	<0.00764		0.00764		<2xRDL
8260B	1,4-DICHLOROBENZENE	mg/kg	0.00416	J	0.00589	<0.00764		0.00764		<2xRDL
8260B	DICHLORODIFLUOROMETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	1,1-DICHLOROETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	1,2-DICHLOROETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	1,1-DICHLOROETHENE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	CIS-1,2-DICHLOROETHENE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	TRANS-1,2-DICHLOROETHENE	mg/kg	<0.00589		0.00589	<0.00764		0.00764		<2xRDL
8260B	1,2-DICHLOROPROPANE	mg/kg	0.0699	*	0.00589	<0.00764	*	0.00764		**>2xRDL**
8260B	1,1-DICHLOROPROPENE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	1,3-DICHLOROPROPANE	mg/kg	<0.00589		0.00589	<0.00764		0.00764		<2xRDL
8260B	CIS-1,3-DICHLOROPROPENE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	TRANS-1,3-DICHLOROPROPENE	mg/kg	<0.00589		0.00589	<0.00764		0.00764		<2xRDL
8260B	2,2-DICHLOROPROPANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	DI-ISOPROPYL ETHER	mg/kg	<0.00118		0.00118	<0.00153		0.00153		<2xRDL
8260B	ETHYLBENZENE	mg/kg	0.0135		0.00295	0.0823		0.00382		**>2xRDL**
8260B	HEXACHLORO-1,3-BUTADIENE	mg/kg	<0.0295		0.0295	<0.0382		0.0382		<2xRDL
8260B	ISOPROPYLBENZENE	mg/kg	0.00401		0.00295	0.018		0.00382		**>2xRDL**
8260B	P-ISOPROPYLTOLUENE	mg/kg	0.00895		0.00589	<0.00764		0.00764		<2xRDL
8260B	2-BUTANONE (MEK)	mg/kg	<0.0295		0.0295	<0.0382		0.0382		<2xRDL
8260B	METHYLENE CHLORIDE	mg/kg	<0.0295		0.0295	<0.0382		0.0382		<2xRDL
8260B	4-METHYL-2-PENTANONE (MIBK)	mg/kg	<0.0295		0.0295	<0.0382		0.0382		<2xRDL
8260B	METHYL TERT-BUTYL ETHER	mg/kg	<0.00118		0.00118	<0.00153		0.00153		<2xRDL
8260B	NAPHTHALENE	mg/kg	0.042		0.0147	0.173		0.0191		**>2xRDL**
8260B	N-PROPYLBENZENE	mg/kg	0.00734		0.00589	<0.00764		0.00764		<2xRDL
8260B	STYRENE	mg/kg	<0.0147		0.0147	<0.0191		0.0191		<2xRDL
8260B	1,1,1,2-TETRACHLOROETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	1,1,2,2-TETRACHLOROETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	1,1,2-TRICHLOROTRIFLUOROETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	TETRACHLOROETHENE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	TOLUENE	mg/kg	0.0848		0.00589	0.417		0.00764	**132%**	
8260B	1,2,3-TRICHLOROBENZENE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	1,2,4-TRICHLOROBENZENE	mg/kg	<0.0147		0.0147	<0.0191		0.0191		<2xRDL
8260B	1,1,1-TRICHLOROETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	1,1,2-TRICHLOROETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	TRICHLOROETHENE	mg/kg	1.54	*	0.00118	7.06	*	0.0611	**128%**	
8260B	TRICHLOROFLUOROMETHANE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	1,2,3-TRICHLOROPROPANE	mg/kg	<0.0147		0.0147	<0.0191		0.0191		<2xRDL
8260B	1,2,4-TRIMETHYLBENZENE	mg/kg	0.0577		0.00589	0.327		0.00764	**140%**	
8260B	1,2,3-TRIMETHYLBENZENE	mg/kg	0.0262		0.00589	0.143		0.00764		**>2xRDL**
8260B	1,3,5-TRIMETHYLBENZENE	mg/kg	0.0196		0.00589	0.0989		0.00764		**>2xRDL**
8260B	VINYL CHLORIDE	mg/kg	<0.00295		0.00295	<0.00382		0.00382		<2xRDL
8260B	XYLENES, TOTAL	mg/kg	0.212		0.00766	1.15		0.00993	**138%**	

1 - Qualifiers:
J: The identification of the analyte is acceptable; the reported value is an estimate.
J3: The associated batch QC was outside the established quality control range for precision.
J4: The associated batch QC was outside the established quality control range for accuracy.
*: 1,2-dichloropropane and trichloroethylene were reported at concentrations close to their regulatory screening levels. As these constituents were outside of their control limits for *Precision* , their analytical results are considered qualified and may not be acceptable for comparison to the screening levels.

2 - RDL - Laboratory reported detection limit

3 - RPD - Relative Percent Difference was calculated when analyte concentrations are greater than or equal to five times the RDL.
QA/QC Goal is less than 50% for solid samples. RPDs greater than 50% are bold and highlighted in orange.

4 - For analytes reported at concentrations less than five times the RDL, the QA/QC Goal is less than two times the RDL for solid samples.
Half the RDL was used for analytes reported less than the RDL. Pairs that exceed two times the RDL are bold and highlighted in orange.

Tabble C7 - Metals in Soil Duplicate Pairs
Schovaers Electronics Property - 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. 61177082

			Duplicate Pair						QA/QC Goals	
Lab Sample ID			L995461-08			L995461-28				
Client Sample ID			**SE-SB-24 (7)**			**SE-SB-34 (7)**				
Date Collected			05/17/2018			05/17/2018				
Method	**Analyte**	**Units**	**Result**	**Q[1]**	**RDL[2]**	**Result**	**Q[1]**	**RDL[2]**	**RPD[3]**	**RDL Evaluation[4]**
3060A/7196A	CHROMIUM,HEXAVALENT	mg/kg	<2.33	J3 J6 O1	2.33	0.752	J P1	2.35		<2xRDL
6010B	ANTIMONY	mg/kg	<2.33		2.33	0.903	J	2.35		<2xRDL
6010B	ARSENIC	mg/kg	20.8		2.33	14.4		2.35	36%	
6010B	BERYLLIUM	mg/kg	0.666		0.233	0.901		0.235		<2xRDL
6010B	CADMIUM	mg/kg	1.11		0.584	0.974		0.588		<2xRDL
6010B	CHROMIUM	mg/kg	15.1		1.17	16.6		1.18	9%	
6010B	COPPER	mg/kg	112		2.33	135		2.35	19%	
6010B	LEAD	mg/kg	295		0.584	219		0.588	30%	
6010B	NICKEL	mg/kg	9.93		2.33	13.3		2.35		<2xRDL
6010B	SELENIUM	mg/kg	1.06	J	2.33	1.03	J	2.35		<2xRDL
6010B	SILVER	mg/kg	0.778	J	1.17	0.646	J	1.18		<2xRDL
6010B	THALLIUM	mg/kg	<2.33		2.33	<2.35		2.35		<2xRDL
6010B	ZINC	mg/kg	135		5.84	135		5.88	0%	
7471A	MERCURY	mg/kg	0.991		0.0233	0.322		0.0235	**102%**	

			Duplicate Pair						QA/QC Goals	
Lab Sample ID			L995461-24			L995461-29				
Client Sample ID			**SE-SB-17 (5)**			**SE-SB-27 (5)**				
Date Collected			05/17/2018			05/17/2018				
Method	**Analyte**	**Units**	**Result**	**Q[1]**	**RDL[2]**	**Result**	**Q[1]**	**RDL[2]**	**RPD[3]**	**RDL Evaluation[4]**
3060A/7196A	CHROMIUM,HEXAVALENT	mg/kg	<2.43		2.43	0.875	J	2.43		<2xRDL

1 - Qualifiers:
J: The identification of the analyte is acceptable; the reported value is an estimate.
J3: The associated batch QC was outside the established quality control range for precision.
J6: The sample matrix interfered with the ability to make any accurate determination; spike value is low.
O1: The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
P1: RPD value not applicable for sample concentrations less than 5 times the reporting limit.
2 - RDL - Laboratory reported detection limit
3 - RPD - Relative Percent Difference was calculated when analyte concentrations are greater than or equal to five times the RDL. QA/QC Goal is less than 50% for solid samples. RPDs greater than 50% are bold and highlighted in orange.
4 - For analytes reported at concentrations less than five times the RDL, the QA/QC Goal is less than two times the RDL for solid samples. Half the RDL was used for analytes reported less than the RDL. Pairs that exceed two times the RDL are bold and

Tbale C8 - VOCs in Groundwater Dulpicate Pair
Schovaers Electronics Property - 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. 61177082

			Duplicate Pair						QA/QC Goals	
Lab Sample ID			L995461-06			L995461-27				
Client Sample ID			**SE-SB-22**			**SE-SB-32**				
Date Collected			05/17/2018			05/17/2018				**RDL**
Method	**Analyte**	**Units**	**Result**	**Q[1]**	**RDL[2]**	**Result**	**Q[1]**	**RDL[2]**	**RPD[3]**	**Evaluation[4]**
8260B	ACETONE	mg/l	<0.0500		0.05	<0.0500		0.05		<RDL
8260B	ACROLEIN	mg/l	<0.0500		0.05	<0.0500	J4	0.05		<RDL
8260B	ACRYLONITRILE	mg/l	<0.0100		0.01	<0.0100		0.01		<RDL
8260B	BENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	BROMOBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	BROMODICHLOROMETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	BROMOFORM	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	BROMOMETHANE	mg/l	<0.00500		0.005	<0.00500		0.005		<RDL
8260B	N-BUTYLBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	SEC-BUTYLBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	TERT-BUTYLBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	CARBON TETRACHLORIDE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	CHLOROBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	CHLORODIBROMOMETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	CHLOROETHANE	mg/l	<0.00500		0.005	<0.00500		0.005		<RDL
8260B	2-CHLOROETHYL VINYL ETHER	mg/l	<0.0500		0.05	<0.0500		0.05		<RDL
8260B	CHLOROFORM	mg/l	<0.00500		0.005	<0.00500		0.005		<RDL
8260B	CHLOROMETHANE	mg/l	<0.00250		0.0025	<0.00250		0.0025		<RDL
8260B	2-CHLOROTOLUENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	4-CHLOROTOLUENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,2-DIBROMO-3-CHLOROPROPANE	mg/l	<0.00500		0.005	<0.00500	J4	0.005		<RDL
8260B	1,2-DIBROMOETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	DIBROMOMETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,2-DICHLOROBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,3-DICHLOROBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,4-DICHLOROBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	DICHLORODIFLUOROMETHANE	mg/l	<0.00500		0.005	<0.00500		0.005		<RDL
8260B	1,1-DICHLOROETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,2-DICHLOROETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,1-DICHLOROETHENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	CIS-1,2-DICHLOROETHENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	TRANS-1,2-DICHLOROETHENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,2-DICHLOROPROPANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,1-DICHLOROPROPENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,3-DICHLOROPROPANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	CIS-1,3-DICHLOROPROPENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	TRANS-1,3-DICHLOROPROPENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	2,2-DICHLOROPROPANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	DI-ISOPROPYL ETHER	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	ETHYLBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	HEXACHLORO-1,3-BUTADIENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	ISOPROPYLBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	P-ISOPROPYLTOLUENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	2-BUTANONE (MEK)	mg/l	<0.0100		0.01	<0.0100		0.01		<RDL
8260B	METHYLENE CHLORIDE	mg/l	<0.00500		0.005	<0.00500		0.005		<RDL
8260B	4-METHYL-2-PENTANONE (MIBK)	mg/l	<0.0100		0.01	<0.0100		0.01		<RDL
8260B	METHYL TERT-BUTYL ETHER	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	NAPHTHALENE	mg/l	<0.00500	J3	0.005	<0.00500	J4	0.005		<RDL
8260B	N-PROPYLBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	STYRENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,1,1,2-TETRACHLOROETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,1,2,2-TETRACHLOROETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,1,2-TRICHLOROTRIFLUOROETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	TETRACHLOROETHENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	TOLUENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,2,3-TRICHLOROBENZENE	mg/l	<0.00100	J3	0.001	<0.00100		0.001		<RDL
8260B	1,2,4-TRICHLOROBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,1,1-TRICHLOROETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,1,2-TRICHLOROETHANE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	TRICHLOROETHENE	mg/l	0.00888		0.001	0.00666		0.001	**29%**	
8260B	TRICHLOROFLUOROMETHANE	mg/l	<0.00500		0.005	<0.00500		0.005		<RDL
8260B	1,2,3-TRICHLOROPROPANE	mg/l	<0.00250		0.0025	<0.00250		0.0025		<RDL
8260B	1,2,4-TRIMETHYLBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,2,3-TRIMETHYLBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	1,3,5-TRIMETHYLBENZENE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	VINYL CHLORIDE	mg/l	<0.00100		0.001	<0.00100		0.001		<RDL
8260B	XYLENES, TOTAL	mg/l	<0.00300		0.003	<0.00300		0.003		<RDL

1 - Qualifiers:
J3: The associated batch QC was outside the established quality control range for precision.
J4: The associated batch QC was outside the established quality control range for accuracy.
2 - RDL - Laboratory reported detection limit
3 - RPD - Relative Percent Difference was calculated when analyte concentrations are greater than or equal to five times the RDL.
QA/QC Goal is less than 25% for aqueous samples. RPDs greater than 25% are bold and highlighted in orange.
4 - For analytes reported at concentrations less than five times the RDL, the QA/QC Goal is less than the RDL for aqueous samples.
Half the RDL was used for analytes reported less than the RDL. Pairs that exceed two times the RDL are bold and highlighted in orange.

Table C9 - Dissolved Metals in Groundwater Duplicate Pair
Schovaers Electronics Property - 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. 61177082

			Duplicate Pair						QA/QC Goals	
Lab Sample ID			L995461-06			L995461-27				
Client Sample ID			**SE-SB-22**			**SE-SB-32**				
Date Collected			05/17/2018			05/17/2018				
Method	**Analyte**	**Units**	**Result**	**Q[1]**	**RDL[2]**	**Result**	**Q[1]**	**RDL[2]**	**RPD[3]**	**RDL Evaluation[4]**
6010B	BERYLLIUM,DISSOLVED	mg/l	<0.00200		0.002	<0.00200		0.002		<RDL
6010B	CADMIUM,DISSOLVED	mg/l	<0.00200		0.002	<0.00200		0.002		<RDL
6010B	CHROMIUM,DISSOLVED	mg/l	<0.0100		0.01	<0.0100		0.01		<RDL
6010B	COPPER,DISSOLVED	mg/l	<0.0100		0.01	<0.0100		0.01		<RDL
6010B	NICKEL,DISSOLVED	mg/l	<0.0100		0.01	<0.0100		0.01		<RDL
6010B	SELENIUM,DISSOLVED	mg/l	<0.0100		0.01	<0.0100		0.01		<RDL
6010B	SILVER,DISSOLVED	mg/l	<0.00500		0.005	<0.00500		0.005		<RDL
6010B	ZINC,DISSOLVED	mg/l	0.0193	J	0.05	0.0207	J	0.05		<RDL
6020	ANTIMONY,DISSOLVED	mg/l	0.000851	J	0.002	0.00103	J	0.002		<RDL
6020	ARSENIC,DISSOLVED	mg/l	0.00111	J	0.002	0.00119	J	0.002		<RDL
6020	LEAD,DISSOLVED	mg/l	<0.00200		0.002	<0.00200		0.002		<RDL
6020	THALLIUM,DISSOLVED	mg/l	<0.00200		0.002	<0.00200		0.002		<RDL
7199	HEXAVALENT CHROMIUM-LOW LEVEL	mg/l	0.000217		0.00006	0.000191	J5	0.00006		<RDL
7470A	MERCURY,DISSOLVED	mg/l	<0.000200		0.0002	<0.000200		0.0002		<RDL

1 - Qualifiers:
J: The identification of the analyte is acceptable; the reported value is an estimate.
J5: The sample matrix interfered with the ability to make any accurate determination; spike value is high.
2 - RDL - Laboratory reported detection limit
3 - RPD - Relative Percent Difference was calculated when analyte concentrations are greater than or equal to five times the RDL. QA/QC Goal is less than 25% for aqueous samples. RPDs greater than 25% are bold and highlighted in orange.
4 - For analytes reported at concentrations less than five times the RDL, the QA/QC Goal is less than the RDL for aqueous samples. Half the RDL was used for analytes reported less than the RDL. Pairs that exceed two times the RDL are bold and highlighted in orange.

Table C10 - Quality Control Summary
Schovaers Electronics Property - 22 South Jeremy Street, Salt Lake City, Utah
ACRES ID #199723
Terracon Project No. 61177082

			Precision (Analytical)					
			LCS/LCSD Pairs			MS/MSD Pairs		
Lab Set	Batch	Analyses	Constituents Analyzed	Constituents in Control	% In Control	Constituents Analyzed	Constituents in Control	% In Control
L995461	WG1114929	Wet Chemistry by Method 3060A/7196A	1	1	100.0%	1	1	100.0%
L995461	WG1114983	Wet Chemistry by Method 3060A/7196A	1	1	100.0%	1	0	0.0%
L995461	WG1115505	Wet Chemistry by Method 3060A/7196A	1	1	100.0%	1	1	100.0%
L995461	WG1117105	Wet Chemistry by Method 3060A/7196A	1	1	100.0%	1	0	0.0%
L995461	WG1113326	Wet Chemistry by Method 7199	1	1	100.0%	1	1	100.0%
L995461	WG1115713	Wet Chemistry by Method 7199	1	1	100.0%	1	1	100.0%
L995461	WG1115429	Mercury by Method 7470A	1	1	100.0%	1	1	100.0%
L995461	WG1114852	Mercury by Method 7471A	1	1	100.0%	1	1	100.0%
L995461	WG1115745	Mercury by Method 7471A	1	1	100.0%	1	1	100.0%
L995461	WG1114824	Metals (ICP) by Method 6010B	12	12	100.0%	12	12	100.0%
L995461	WG1115667	Metals (ICP) by Method 6010B	12	12	100.0%	12	12	100.0%
L995461	WG1115384	Metals (ICP) by Method 6010B	8	8	100.0%	8	8	100.0%
L995461	WG1115388	Metals (ICPMS) by Method 6020	4	4	100.0%	4	4	100.0%
L995461	WG1114510	Volatile Organic Compounds (GC/MS) by Method 8260B	67	65	97.0%	67	66	98.5%
L995461	WG1114542	Volatile Organic Compounds (GC/MS) by Method 8260B	67	67	100.0%	-	-	-
L995461	WG1115415	Volatile Organic Compounds (GC/MS) by Method 8260B	67	67	100.0%	-	-	-
L995461	WG1114961	Volatile Organic Compounds (GC/MS) by Method 8260B	65	64	98.5%	-	-	-
L995461	WG1114961-3	Volatile Organic Compounds (GC/MS) by Method 8260B	2	2	100.0%	-	-	-
L995461	WG1115967	Volatile Organic Compounds (GC/MS) by Method 8260B	64	64	100.0%	64	64	100.0%
L995461	WG1115967-6	Volatile Organic Compounds (GC/MS) by Method 8260B	1	1	100.0%	-	-	-
L995461	WG1116592	Volatile Organic Compounds (GC/MS) by Method 8260B	-	-	-	65	28	43.1%
		Total for Lab Set L995461	378	375	99.2%	241	201	83.4%

Batches with less than 90% of the constituents in control are bold and highlighted in orange.

			Precision (Analytical)					
			LCS/LCSD Pairs			MS/MSD Pairs		
Lab Set	Batch	Analyses	Constituents Analyzed	Constituents in Control	% In Control	Constituents Analyzed	Constituents in Control	% In Control
L995391	WG1114526	Volatile Organic Compounds (MS) by Method TO-15	68	68	100.0%	-	-	-
L995391	WG1115083	Volatile Organic Compounds (MS) by Method TO-15	2	2	100.0%	-	-	-
		Total for Lab Set L995461	70	70	100.0%	0	0	-

Batches with less than 90% of the constituents in control are bold and highlighted in orange.

			Precision (Field)		
			Field Sample/Duplicate Pairs		
Lab Set	Sample / Duplicate	Analyses	Constituents Analyzed	Constituents in Control	% In Control
L995461	L995461-08 / L995461-28	Volatile Organic Compounds (GC/MS) by Method 8260B	65	54	83.1%
L995461	L995461-08 / L995461-28	Wet Chemistry by Method 3060A/7196A	1	1	100.0%
L995461	L995461-08 / L995461-28	Metals (ICP) by Method 6010B	12	12	100.0%
L995461	L995461-08 / L995461-28	Mercury by Method 7471A	1	1	100.0%
L995461	L995461-24 / L995461-29	Wet Chemistry by Method 3060A/7196A	1	1	100.0%
L995461	L995461-06 / L995461-27	Volatile Organic Compounds (GC/MS) by Method 8260B	67	66	98.5%
L995461	L995461-06 / L995461-27	Metals (ICP) by Method 6010B	8	8	100.0%
L995461	L995461-06 / L995461-27	Metals (ICPMS) by Method 6020	4	4	100.0%
L995461	L995461-06 / L995461-27	Wet Chemistry by Method 7199	1	1	100.0%
L995461	L995461-06 / L995461-27	Mercury by Method 7470A	1	1	100.0%
		Total for Lab Set L995461	161	149	92.5%

Analyses with less than 90% of the constituents in control are bold and highlighted in orange.

			Bias					
			LCS/LCSD % Recoveries			MS/MSD % Recoveries		
Lab Set	Batch	Analyses	Constituents Analyzed	Constituents in Control	% In Control	Constituents Analyzed	Constituents in Control	% In Control
L995461	WG1114929	Wet Chemistry by Method 3060A/7196A	2	2	100.0%	2	2	100.0%
L995461	WG1114983	Wet Chemistry by Method 3060A/7196A	2	2	100.0%	2	0	0.0%
L995461	WG1115505	Wet Chemistry by Method 3060A/7196A	2	2	100.0%	2	1	50.0%
L995461	WG1117105	Wet Chemistry by Method 3060A/7196A	2	2	100.0%	2	0	0.0%
L995461	WG1113326	Wet Chemistry by Method 7199	2	2	100.0%	2	1	50.0%
L995461	WG1115713	Wet Chemistry by Method 7199	2	2	100.0%	2	0	0.0%
L995461	WG1115429	Mercury by Method 7470A	2	2	100.0%	2	2	100.0%
L995461	WG1114852	Mercury by Method 7471A	2	2	100.0%	2	2	100.0%
L995461	WG1115745	Mercury by Method 7471A	2	2	100.0%	2	2	100.0%
L995461	WG1114824	Metals (ICP) by Method 6010B	24	24	100.0%	24	20	83.3%
L995461	WG1115667	Metals (ICP) by Method 6010B	24	24	100.0%	24	22	91.7%
L995461	WG1115384	Metals (ICP) by Method 6010B	16	16	100.0%	16	16	100.0%
L995461	WG1115388	Metals (ICPMS) by Method 6020	8	8	100.0%	8	8	100.0%
L995461	WG1114510	Volatile Organic Compounds (GC/MS) by Method 8260B	134	134	100.0%	134	132	98.5%
L995461	WG1114542	Volatile Organic Compounds (GC/MS) by Method 8260B	134	134	100.0%	-	-	-
L995461	WG1115415	Volatile Organic Compounds (GC/MS) by Method 8260B	134	130	97.0%	-	-	-
L995461	WG1114961	Volatile Organic Compounds (GC/MS) by Method 8260B	130	129	99.2%	-	-	-
L995461	WG1114961-3	Volatile Organic Compounds (GC/MS) by Method 8260B	4	4	100.0%	-	-	-
L995461	WG1115967	Volatile Organic Compounds (GC/MS) by Method 8260B	128	127	99.2%	128	128	100.0%
L995461	WG1115967-6	Volatile Organic Compounds (GC/MS) by Method 8260B	2	2	100.0%	-	-	-
L995461	WG1116592	Volatile Organic Compounds (GC/MS) by Method 8260B	130	129	99.2%	130	129	99.2%
		Total for Lab Set L995461	886	879	99.2%	482	465	96.5%

APPENDIX D
Chain of Custody and Laboratory Data Sheets

ANALYTICAL REPORT

June 28, 2018

Terracon - Salt Lake City, UT

Sample Delivery Group:	L995461
Samples Received:	05/19/2018
Project Number:	61177082
Description:	SL County Brownfields, McKinnon Enterprises

Report To: David Jamison
6949 South High Tech Drive
Midvale, UT 84047

Entire Report Reviewed By:

Daphne R Richards

Daphne Richards
Technical Service Representative

SE-SB-21 (3) L995461-01 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 09:00 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1114986	1	05/23/18 10:55	05/23/18 11:07	KDW
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:35	ITB
Wet Chemistry by Method 9045D	WG1114755	1	05/23/18 07:07	05/23/18 08:52	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:01	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 11:49	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1	05/17/18 09:00	05/23/18 14:32	DWR

SE-SB-21 (7) L995461-02 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 09:08 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1114986	1	05/23/18 10:55	05/23/18 11:07	KDW
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:37	ITB
Wet Chemistry by Method 9045D	WG1114755	1	05/23/18 07:07	05/23/18 08:52	EEM
Mercury by Method 7471A	WG1114852	2	05/23/18 01:35	05/24/18 08:08	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:07	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1.07	05/17/18 09:08	05/23/18 14:52	DWR
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961-3	42.4	05/17/18 09:08	05/24/18 16:21	LRL

SE-SB-21 L995461-03 GW

Collected by: David Jamison | Collected date/time: 05/17/18 09:30 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 7199	WG1113326	1	05/22/18 14:55	05/22/18 14:55	GB
Mercury by Method 7470A	WG1115429	1	05/24/18 03:09	05/24/18 10:10	ABL
Metals (ICP) by Method 6010B	WG1115384	1	05/25/18 10:20	05/25/18 13:06	WBD
Metals (ICPMS) by Method 6020	WG1115388	1	05/24/18 14:05	05/25/18 18:20	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114510	1	05/22/18 16:50	05/22/18 16:50	LRL

SE-SB-22 (3) L995461-04 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 09:50 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115189	1	05/24/18 10:55	05/24/18 11:04	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:40	ITB
Wet Chemistry by Method 9045D	WG1114755	1	05/23/18 07:07	05/23/18 08:52	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:12	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:10	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1	05/17/18 09:50	05/23/18 15:13	DWR
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961-3	1	05/17/18 09:50	05/24/18 14:21	LRL

SE-SB-22 (7) L995461-05 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 09:58 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115189	1	05/24/18 10:55	05/24/18 11:04	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:42	ITB
Wet Chemistry by Method 9045D	WG1114755	1	05/23/18 07:07	05/23/18 08:52	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:15	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:20	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1	05/17/18 09:58	05/23/18 15:34	DWR

SE-SB-22 L995461-06 GW

Collected by: David Jamison | Collected date/time: 05/17/18 10:10 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 7199	WG1113326	1	05/22/18 15:03	05/22/18 15:03	GB
Mercury by Method 7470A	WG1115429	1	05/24/18 03:09	05/24/18 10:18	ABL
Metals (ICP) by Method 6010B	WG1115384	1	05/25/18 10:20	05/25/18 13:08	WBD
Metals (ICPMS) by Method 6020	WG1115388	1	05/24/18 14:05	05/25/18 18:24	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114510	1	05/22/18 17:11	05/22/18 17:11	LRL

SE-SB-24 (3) L995461-07 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 10:40 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115189	1	05/24/18 10:55	05/24/18 11:04	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:42	ITB
Wet Chemistry by Method 9045D	WG1114755	1	05/23/18 07:07	05/23/18 08:52	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:21	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:23	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1.18	05/17/18 10:40	05/23/18 15:55	DWR
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961-3	1.17	05/17/18 10:40	05/24/18 14:41	LRL

SE-SB-24 (7) L995461-08 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 10:48 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115189	1	05/24/18 10:55	05/24/18 11:04	JD
Wet Chemistry by Method 3060A/7196A	WG1117105	1	05/29/18 08:28	05/29/18 15:39	ITB
Wet Chemistry by Method 9045D	WG1114879	1	05/23/18 07:34	05/23/18 08:50	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:23	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:27	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1.01	05/17/18 10:48	05/23/18 16:16	DWR

SE-SB-23 (3) L995461-09 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 11:20 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115189	1	05/24/18 10:55	05/24/18 11:04	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:50	ITB
Wet Chemistry by Method 9045D	WG1114879	1	05/23/18 07:34	05/23/18 08:50	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:26	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:30	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1	05/17/18 11:20	05/23/18 16:36	DWR
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961-3	1	05/17/18 11:20	05/24/18 15:01	LRL

SE-SB-23 (10) L995461-10 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 11:29 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115189	1	05/24/18 10:55	05/24/18 11:04	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:51	ITB
Wet Chemistry by Method 9045D	WG1114879	1	05/23/18 07:34	05/23/18 08:50	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:28	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:34	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1	05/17/18 11:29	05/23/18 16:57	DWR
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961-3	1	05/17/18 11:29	05/24/18 15:21	LRL

SE-SB-23 L995461-11 GW

Collected by: David Jamison | Collected date/time: 05/17/18 11:40 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 7199	WG1113326	1	05/22/18 15:12	05/22/18 15:12	GB
Mercury by Method 7470A	WG1115429	1	05/24/18 03:09	05/24/18 10:21	ABL
Metals (ICP) by Method 6010B	WG1115384	1	05/25/18 10:20	05/25/18 13:11	WBD
Metals (ICPMS) by Method 6020	WG1115388	1	05/24/18 14:05	05/25/18 18:29	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114510	1	05/22/18 17:31	05/22/18 17:31	LRL

SE-SB-20 (3) L995461-12 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 11:50 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115189	1	05/24/18 10:55	05/24/18 11:04	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:53	ITB
Wet Chemistry by Method 9045D	WG1114879	1	05/23/18 07:34	05/23/18 08:50	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:30	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:37	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1	05/17/18 11:50	05/23/18 17:18	DWR
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961-3	1	05/17/18 11:50	05/24/18 15:41	LRL

SE-SB-20 (11) L995461-13 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 11:58 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115189	1	05/24/18 10:55	05/24/18 11:04	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:53	ITB
Wet Chemistry by Method 9045D	WG1114879	1	05/23/18 07:34	05/23/18 08:50	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:32	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:41	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1	05/17/18 11:58	05/23/18 17:39	DWR
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961-3	1	05/17/18 11:58	05/24/18 16:00	LRL

SE-SB-20 L995461-14 GW

Collected by: David Jamison | Collected date/time: 05/17/18 12:15 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 7199	WG1113326	1	05/22/18 15:36	05/22/18 15:36	GB
Mercury by Method 7470A	WG1115429	1	05/24/18 03:09	05/24/18 10:23	ABL
Metals (ICP) by Method 6010B	WG1115384	1	05/25/18 10:20	05/25/18 13:19	WBD
Metals (ICPMS) by Method 6020	WG1115388	1	05/24/18 14:05	05/25/18 18:42	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114510	1	05/22/18 17:51	05/22/18 17:51	LRL

SE-SB-19 (4) L995461-15 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 12:27 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115191	1	05/24/18 10:13	05/24/18 10:18	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:54	ITB
Wet Chemistry by Method 9045D	WG1114879	1	05/23/18 07:34	05/23/18 08:50	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:34	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:45	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1	05/17/18 12:27	05/23/18 17:59	DWR

SE-SB-19 (8) L995461-16 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 12:35 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115191	1	05/24/18 10:13	05/24/18 10:18	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:54	ITB
Wet Chemistry by Method 9045D	WG1114879	1	05/23/18 07:34	05/23/18 08:50	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:36	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:48	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1	05/17/18 12:35	05/23/18 18:20	DWR

SE-SB-19 L995461-17 GW

Collected by: David Jamison | Collected date/time: 05/17/18 12:43 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 7199	WG1113326	1	05/22/18 15:44	05/22/18 15:44	GB
Mercury by Method 7470A	WG1115429	1	05/24/18 03:09	05/24/18 10:26	ABL
Metals (ICP) by Method 6010B	WG1115384	1	05/25/18 10:20	05/25/18 13:21	WBD
Metals (ICPMS) by Method 6020	WG1115388	1	05/24/18 14:05	05/25/18 18:46	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114510	1	05/22/18 18:11	05/22/18 18:11	LRL

SE-SB-18 (3) L995461-18 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 12:58 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115191	1	05/24/18 10:13	05/24/18 10:18	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:57	ITB
Wet Chemistry by Method 9045D	WG1114879	1	05/23/18 07:34	05/23/18 08:50	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:39	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 12:52	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114961	1	05/17/18 12:58	05/23/18 18:40	DWR

SE-SB-18 (8) L995461-19 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 13:05 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115191	1	05/24/18 10:13	05/24/18 10:18	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:58	ITB
Wet Chemistry by Method 9045D	WG1114879	1	05/23/18 07:34	05/23/18 08:50	EEM
Mercury by Method 7471A	WG1114852	1	05/23/18 01:35	05/24/18 08:50	ABL
Metals (ICP) by Method 6010B	WG1114824	1	05/23/18 17:31	05/24/18 13:12	CCE
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1116592	1	05/17/18 13:05	05/26/18 14:38	DWR

SE-SB-18 L995461-20 GW

Collected by: David Jamison | Collected date/time: 05/17/18 13:20 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 7199	WG1113326	1	05/22/18 15:52	05/22/18 15:52	GB
Mercury by Method 7470A	WG1115429	1	05/24/18 03:09	05/24/18 10:33	ABL
Metals (ICP) by Method 6010B	WG1115384	1	05/25/18 10:20	05/25/18 13:24	WBD
Metals (ICPMS) by Method 6020	WG1115388	1	05/24/18 14:05	05/25/18 18:51	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114510	1	05/22/18 18:31	05/22/18 18:31	LRL

SE-SB-16 (2.5) L995461-21 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 13:40 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115191	1	05/24/18 10:13	05/24/18 10:18	JD
Wet Chemistry by Method 3060A/7196A	WG1114983	1	05/23/18 15:30	05/24/18 13:58	ITB

SE-SB-16 (5) L995461-22 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 13:42 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115191	1	05/24/18 10:13	05/24/18 10:18	JD
Wet Chemistry by Method 3060A/7196A	WG1114929	1	05/23/18 09:15	05/23/18 15:19	MLW

SE-SB-17 (2.5) L995461-23 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 14:19 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115191	1	05/24/18 10:13	05/24/18 10:18	JD
Wet Chemistry by Method 3060A/7196A	WG1114929	1	05/23/18 09:15	05/23/18 15:22	MLW

SE-SB-17 (5) L995461-24 Solid

Collected by: David Jamison | Collected date/time: 05/17/18 14:22 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115191	1	05/24/18 10:13	05/24/18 10:18	JD
Wet Chemistry by Method 3060A/7196A	WG1114929	1	05/23/18 09:15	05/23/18 15:25	MLW

SE-SB-17 L995461-25 GW

Collected by: David Jamison | Collected date/time: 05/17/18 14:50 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 7199	WG1113326	1	05/22/18 16:44	05/22/18 16:44	GB
Mercury by Method 7470A	WG1115429	1	05/24/18 03:09	05/24/18 10:36	ABL
Metals (ICP) by Method 6010B	WG1115384	1	05/25/18 10:20	05/25/18 13:26	WBD
Metals (ICPMS) by Method 6020	WG1115388	1	05/24/18 14:05	05/25/18 18:55	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114510	1	05/22/18 18:51	05/22/18 18:51	LRL

TRIP BLANK L995461-26 GW

Collected by: David Jamison | Collected date/time: 05/17/18 00:00 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1114542	1	05/22/18 14:19	05/22/18 14:19	BMB

SE-SB-32 L995461-27 GW

Collected by: David Jamison | Collected date/time: 05/17/18 15:10 | Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 7199	WG1115713	1	05/25/18 16:34	05/25/18 16:34	GB
Mercury by Method 7470A	WG1115429	1	05/24/18 03:09	05/24/18 10:38	ABL
Metals (ICP) by Method 6010B	WG1115384	1	05/25/18 10:20	05/25/18 13:29	WBD
Metals (ICPMS) by Method 6020	WG1115388	1	05/24/18 14:05	05/25/18 18:59	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1115415	1	05/24/18 00:10	05/24/18 00:10	JBE

SE-SB-34 (7) L995461-28 Solid

Collected by: David Jamison
Collected date/time: 05/17/18 15:20
Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115281	1	05/24/18 11:11	05/24/18 11:18	JD
Wet Chemistry by Method 3060A/7196A	WG1115505	1	05/24/18 07:00	05/24/18 12:52	EEM
Wet Chemistry by Method 9045D	WG1115501	1	05/24/18 09:20	05/24/18 11:47	MLW
Mercury by Method 7471A	WG1115745	1	05/24/18 13:39	05/25/18 08:51	ABL
Metals (ICP) by Method 6010B	WG1115667	1	05/24/18 17:56	05/26/18 13:48	WBD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1115967	1.3	05/17/18 15:20	05/25/18 02:52	LRL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1115967-6	52	05/17/18 15:20	05/29/18 11:00	JAH

SE-SB-27 (5) L995461-29 Solid

Collected by: David Jamison
Collected date/time: 05/17/18 15:30
Received date/time: 05/19/18 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1115281	1	05/24/18 11:11	05/24/18 11:18	JD
Wet Chemistry by Method 3060A/7196A	WG1115505	1	05/24/18 07:00	05/24/18 12:32	EEM

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne R Richards

Daphne Richards
Technical Service Representative

Sample Handling and Receiving

The following analysis were performed from an unpreserved, insufficiently or inadequately preserved sample.

ESC Sample ID	Project Sample ID	Method
L995461-03	SE-SB-21	7199
L995461-20	SE-SB-18	7199
L995461-27	SE-SB-32	7199

The analysis for 2-Chloroethyl Vinyl Ether was conducted from a chemically preserved container.

ESC Sample ID	Project Sample ID	Method
L995461-26	TRIP BLANK	8260B

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	89.4		1	05/23/2018 11:07	WG1114986

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.716	2.24	1	05/24/2018 13:35	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.43	T8	1	05/23/2018 08:52	WG1114755

Sample Narrative:

L995461-01 WG1114755: 8.43 at 21.4C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0836		0.00313	0.0224	1	05/24/2018 08:01	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U	J6	0.839	2.24	1	05/24/2018 11:49	WG1114824
Arsenic	5.74		0.727	2.24	1	05/24/2018 11:49	WG1114824
Beryllium	0.622		0.0783	0.224	1	05/24/2018 11:49	WG1114824
Cadmium	1.27		0.0783	0.560	1	05/24/2018 11:49	WG1114824
Chromium	15.0		0.157	1.12	1	05/24/2018 11:49	WG1114824
Copper	13.7		0.593	2.24	1	05/24/2018 11:49	WG1114824
Lead	51.8		0.213	0.560	1	05/24/2018 11:49	WG1114824
Nickel	17.1		0.548	2.24	1	05/24/2018 11:49	WG1114824
Selenium	1.75	J	0.828	2.24	1	05/24/2018 11:49	WG1114824
Silver	U		0.313	1.12	1	05/24/2018 11:49	WG1114824
Thallium	U		0.727	2.24	1	05/24/2018 11:49	WG1114824
Zinc	94.0	J6	0.660	5.60	1	05/24/2018 11:49	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J3	0.0153	0.0280	1	05/23/2018 14:32	WG1114961
Acrylonitrile	U		0.00213	0.0140	1	05/23/2018 14:32	WG1114961
Benzene	U		0.000448	0.00112	1	05/23/2018 14:32	WG1114961
Bromobenzene	U		0.00118	0.0140	1	05/23/2018 14:32	WG1114961
Bromodichloromethane	U		0.000882	0.00280	1	05/23/2018 14:32	WG1114961
Bromoform	U		0.00669	0.0280	1	05/23/2018 14:32	WG1114961
Bromomethane	U		0.00414	0.0140	1	05/23/2018 14:32	WG1114961
n-Butylbenzene	U		0.00430	0.0140	1	05/23/2018 14:32	WG1114961
sec-Butylbenzene	U		0.00283	0.0140	1	05/23/2018 14:32	WG1114961
tert-Butylbenzene	U		0.00173	0.00560	1	05/23/2018 14:32	WG1114961
Carbon tetrachloride	U		0.00121	0.00560	1	05/23/2018 14:32	WG1114961
Chlorobenzene	U		0.000641	0.00280	1	05/23/2018 14:32	WG1114961
Chlorodibromomethane	U		0.000504	0.00280	1	05/23/2018 14:32	WG1114961
Chloroethane	U		0.00121	0.00560	1	05/23/2018 14:32	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000464	0.00280	1	05/23/2018 14:32	WG1114961
Chloromethane	U		0.00156	0.0140	1	05/23/2018 14:32	WG1114961
2-Chlorotoluene	U		0.00103	0.00280	1	05/23/2018 14:32	WG1114961
4-Chlorotoluene	U	J4	0.00126	0.00560	1	05/23/2018 14:32	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00571	0.0280	1	05/23/2018 14:32	WG1114961
1,2-Dibromoethane	U		0.000588	0.00280	1	05/23/2018 14:32	WG1114961
Dibromomethane	U		0.00112	0.00560	1	05/23/2018 14:32	WG1114961
1,2-Dichlorobenzene	U		0.00162	0.00560	1	05/23/2018 14:32	WG1114961
1,3-Dichlorobenzene	U		0.00190	0.00560	1	05/23/2018 14:32	WG1114961
1,4-Dichlorobenzene	0.00426	J	0.00220	0.00560	1	05/23/2018 14:32	WG1114961
Dichlorodifluoromethane	U		0.000915	0.00280	1	05/23/2018 14:32	WG1114961
1,1-Dichloroethane	U		0.000643	0.00280	1	05/23/2018 14:32	WG1114961
1,2-Dichloroethane	U		0.000532	0.00280	1	05/23/2018 14:32	WG1114961
1,1-Dichloroethene	U		0.000560	0.00280	1	05/23/2018 14:32	WG1114961
cis-1,2-Dichloroethene	U		0.000772	0.00280	1	05/23/2018 14:32	WG1114961
trans-1,2-Dichloroethene	U		0.00160	0.00560	1	05/23/2018 14:32	WG1114961
1,2-Dichloropropane	U		0.00142	0.00560	1	05/23/2018 14:32	WG1114961
1,1-Dichloropropene	U		0.000783	0.00280	1	05/23/2018 14:32	WG1114961
1,3-Dichloropropane	U		0.00196	0.00560	1	05/23/2018 14:32	WG1114961
cis-1,3-Dichloropropene	U		0.000759	0.00280	1	05/23/2018 14:32	WG1114961
trans-1,3-Dichloropropene	U		0.00171	0.00560	1	05/23/2018 14:32	WG1114961
2,2-Dichloropropane	U		0.000887	0.00280	1	05/23/2018 14:32	WG1114961
Di-isopropyl ether	U		0.000392	0.00112	1	05/23/2018 14:32	WG1114961
Ethylbenzene	U		0.000593	0.00280	1	05/23/2018 14:32	WG1114961
Hexachloro-1,3-butadiene	U		0.0142	0.0280	1	05/23/2018 14:32	WG1114961
Isopropylbenzene	U		0.000966	0.00280	1	05/23/2018 14:32	WG1114961
p-Isopropyltoluene	U		0.00261	0.00560	1	05/23/2018 14:32	WG1114961
2-Butanone (MEK)	U		0.0140	0.0280	1	05/23/2018 14:32	WG1114961
Methylene Chloride	U		0.00743	0.0280	1	05/23/2018 14:32	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0112	0.0280	1	05/23/2018 14:32	WG1114961
Methyl tert-butyl ether	U		0.000330	0.00112	1	05/23/2018 14:32	WG1114961
Naphthalene	U		0.00349	0.0140	1	05/23/2018 14:32	WG1114961
n-Propylbenzene	U		0.00132	0.00560	1	05/23/2018 14:32	WG1114961
Styrene	U		0.00306	0.0140	1	05/23/2018 14:32	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000560	0.00280	1	05/23/2018 14:32	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000436	0.00280	1	05/23/2018 14:32	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000755	0.00280	1	05/23/2018 14:32	WG1114961
Tetrachloroethene	U		0.000783	0.00280	1	05/23/2018 14:32	WG1114961
Toluene	0.00311	J	0.00140	0.00560	1	05/23/2018 14:32	WG1114961
1,2,3-Trichlorobenzene	U		0.000699	0.00280	1	05/23/2018 14:32	WG1114961
1,2,4-Trichlorobenzene	U		0.00539	0.0140	1	05/23/2018 14:32	WG1114961
1,1,1-Trichloroethane	U		0.000308	0.00280	1	05/23/2018 14:32	WG1114961
1,1,2-Trichloroethane	U		0.000988	0.00280	1	05/23/2018 14:32	WG1114961
Trichloroethene	0.0114		0.000448	0.00112	1	05/23/2018 14:32	WG1114961
Trichlorofluoromethane	U		0.000560	0.00280	1	05/23/2018 14:32	WG1114961
1,2,3-Trichloropropane	U		0.00571	0.0140	1	05/23/2018 14:32	WG1114961
1,2,4-Trimethylbenzene	U		0.00130	0.00560	1	05/23/2018 14:32	WG1114961
1,2,3-Trimethylbenzene	U		0.00129	0.00560	1	05/23/2018 14:32	WG1114961
1,3,5-Trimethylbenzene	U		0.00121	0.00560	1	05/23/2018 14:32	WG1114961
Vinyl chloride	U		0.000764	0.00280	1	05/23/2018 14:32	WG1114961
Xylenes, Total	U		0.00535	0.00727	1	05/23/2018 14:32	WG1114961
(S) Toluene-d8	*116*			*80.0-120*		*05/23/2018 14:32*	WG1114961
(S) Dibromofluoromethane	*91.5*			*74.0-131*		*05/23/2018 14:32*	WG1114961
(S) 4-Bromofluorobenzene	*113*			*64.0-132*		*05/23/2018 14:32*	WG1114961

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	76.5		1	05/23/2018 11:07	WG1114986

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.837	2.62	1	05/24/2018 13:37	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.64	T8	1	05/23/2018 08:52	WG1114755

Sample Narrative:

L995461-02 WG1114755: 7.64 at 21.3C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	1.42		0.00732	0.0523	2	05/24/2018 08:08	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.981	2.62	1	05/24/2018 12:07	WG1114824
Arsenic	52.9		0.850	2.62	1	05/24/2018 12:07	WG1114824
Beryllium	0.780		0.0915	0.262	1	05/24/2018 12:07	WG1114824
Cadmium	2.53		0.0915	0.654	1	05/24/2018 12:07	WG1114824
Chromium	19.3		0.183	1.31	1	05/24/2018 12:07	WG1114824
Copper	101		0.693	2.62	1	05/24/2018 12:07	WG1114824
Lead	508		0.248	0.654	1	05/24/2018 12:07	WG1114824
Nickel	10.6		0.641	2.62	1	05/24/2018 12:07	WG1114824
Selenium	1.16	J	0.968	2.62	1	05/24/2018 12:07	WG1114824
Silver	0.439	J	0.366	1.31	1	05/24/2018 12:07	WG1114824
Thallium	U		0.850	2.62	1	05/24/2018 12:07	WG1114824
Zinc	280		0.771	6.54	1	05/24/2018 12:07	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J3	0.0191	0.0350	1.07	05/23/2018 14:52	WG1114961
Acrylonitrile	U		0.00265	0.0175	1.07	05/23/2018 14:52	WG1114961
Benzene	0.0178		0.000560	0.00140	1.07	05/23/2018 14:52	WG1114961
Bromobenzene	U		0.00146	0.0175	1.07	05/23/2018 14:52	WG1114961
Bromodichloromethane	0.460		0.00110	0.00350	1.07	05/23/2018 14:52	WG1114961
Bromoform	U		0.00837	0.0350	1.07	05/23/2018 14:52	WG1114961
Bromomethane	U		0.00518	0.0175	1.07	05/23/2018 14:52	WG1114961
n-Butylbenzene	0.00670	J	0.00537	0.0175	1.07	05/23/2018 14:52	WG1114961
sec-Butylbenzene	U		0.00354	0.0175	1.07	05/23/2018 14:52	WG1114961
tert-Butylbenzene	U		0.00217	0.00700	1.07	05/23/2018 14:52	WG1114961
Carbon tetrachloride	U		0.00152	0.00700	1.07	05/23/2018 14:52	WG1114961
Chlorobenzene	U		0.000802	0.00350	1.07	05/23/2018 14:52	WG1114961
Chlorodibromomethane	U		0.000630	0.00350	1.07	05/23/2018 14:52	WG1114961
Chloroethane	U		0.00152	0.00700	1.07	05/23/2018 14:52	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	0.0117		0.000581	0.00350	1.07	05/23/2018 14:52	WG1114961
Chloromethane	U		0.00195	0.0175	1.07	05/23/2018 14:52	WG1114961
2-Chlorotoluene	U		0.00129	0.00350	1.07	05/23/2018 14:52	WG1114961
4-Chlorotoluene	U	J4	0.00158	0.00700	1.07	05/23/2018 14:52	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00714	0.0350	1.07	05/23/2018 14:52	WG1114961
1,2-Dibromoethane	U		0.000735	0.00350	1.07	05/23/2018 14:52	WG1114961
Dibromomethane	U		0.00140	0.00700	1.07	05/23/2018 14:52	WG1114961
1,2-Dichlorobenzene	U		0.00203	0.00700	1.07	05/23/2018 14:52	WG1114961
1,3-Dichlorobenzene	U		0.00238	0.00700	1.07	05/23/2018 14:52	WG1114961
1,4-Dichlorobenzene	0.00402	J	0.00276	0.00700	1.07	05/23/2018 14:52	WG1114961
Dichlorodifluoromethane	U		0.00114	0.00350	1.07	05/23/2018 14:52	WG1114961
1,1-Dichloroethane	U		0.000804	0.00350	1.07	05/23/2018 14:52	WG1114961
1,2-Dichloroethane	0.00105	J	0.000664	0.00350	1.07	05/23/2018 14:52	WG1114961
1,1-Dichloroethene	U		0.000700	0.00350	1.07	05/23/2018 14:52	WG1114961
cis-1,2-Dichloroethene	U		0.000965	0.00350	1.07	05/23/2018 14:52	WG1114961
trans-1,2-Dichloroethene	U		0.00200	0.00700	1.07	05/23/2018 14:52	WG1114961
1,2-Dichloropropane	2.11		0.00178	0.00700	1.07	05/23/2018 14:52	WG1114961
1,1-Dichloropropene	U		0.000979	0.00350	1.07	05/23/2018 14:52	WG1114961
1,3-Dichloropropane	U		0.00245	0.00700	1.07	05/23/2018 14:52	WG1114961
cis-1,3-Dichloropropene	U		0.000948	0.00350	1.07	05/23/2018 14:52	WG1114961
trans-1,3-Dichloropropene	U		0.00214	0.00700	1.07	05/23/2018 14:52	WG1114961
2,2-Dichloropropane	U		0.00111	0.00350	1.07	05/23/2018 14:52	WG1114961
Di-isopropyl ether	U		0.000489	0.00140	1.07	05/23/2018 14:52	WG1114961
Ethylbenzene	0.0238		0.000741	0.00350	1.07	05/23/2018 14:52	WG1114961
Hexachloro-1,3-butadiene	U		0.0178	0.0350	1.07	05/23/2018 14:52	WG1114961
Isopropylbenzene	0.00856		0.00121	0.00350	1.07	05/23/2018 14:52	WG1114961
p-Isopropyltoluene	0.0173		0.00326	0.00700	1.07	05/23/2018 14:52	WG1114961
2-Butanone (MEK)	U		0.0175	0.0350	1.07	05/23/2018 14:52	WG1114961
Methylene Chloride	U		0.00928	0.0350	1.07	05/23/2018 14:52	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0140	0.0350	1.07	05/23/2018 14:52	WG1114961
Methyl tert-butyl ether	U		0.000413	0.00140	1.07	05/23/2018 14:52	WG1114961
Naphthalene	0.110		0.00437	0.0175	1.07	05/23/2018 14:52	WG1114961
n-Propylbenzene	0.0106		0.00165	0.00700	1.07	05/23/2018 14:52	WG1114961
Styrene	U		0.00382	0.0175	1.07	05/23/2018 14:52	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000700	0.00350	1.07	05/23/2018 14:52	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000545	0.00350	1.07	05/23/2018 14:52	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000944	0.00350	1.07	05/23/2018 14:52	WG1114961
Tetrachloroethene	0.00908		0.000979	0.00350	1.07	05/23/2018 14:52	WG1114961
Toluene	0.112		0.00175	0.00700	1.07	05/23/2018 14:52	WG1114961
1,2,3-Trichlorobenzene	U		0.000875	0.00350	1.07	05/23/2018 14:52	WG1114961
1,2,4-Trichlorobenzene	U		0.00675	0.0175	1.07	05/23/2018 14:52	WG1114961
1,1,1-Trichloroethane	0.00692		0.000384	0.00350	1.07	05/23/2018 14:52	WG1114961
1,1,2-Trichloroethane	U		0.00124	0.00350	1.07	05/23/2018 14:52	WG1114961
Trichloroethene	45.2		0.0222	0.0554	42.4	05/24/2018 16:21	WG1114961-3
Trichlorofluoromethane	U		0.000700	0.00350	1.07	05/23/2018 14:52	WG1114961
1,2,3-Trichloropropane	U		0.00714	0.0175	1.07	05/23/2018 14:52	WG1114961
1,2,4-Trimethylbenzene	0.108		0.00162	0.00700	1.07	05/23/2018 14:52	WG1114961
1,2,3-Trimethylbenzene	0.0534		0.00161	0.00700	1.07	05/23/2018 14:52	WG1114961
1,3,5-Trimethylbenzene	0.0324		0.00152	0.00700	1.07	05/23/2018 14:52	WG1114961
Vinyl chloride	U		0.000956	0.00350	1.07	05/23/2018 14:52	WG1114961
Xylenes, Total	0.309		0.00668	0.00909	1.07	05/23/2018 14:52	WG1114961
(S) Toluene-d8	*116*			*80.0-120*		*05/23/2018 14:52*	WG1114961
(S) Toluene-d8	*103*			*80.0-120*		*05/24/2018 16:21*	WG1114961-3
(S) Dibromofluoromethane	*88.7*			*74.0-131*		*05/23/2018 14:52*	WG1114961
(S) Dibromofluoromethane	*97.3*			*74.0-131*		*05/24/2018 16:21*	WG1114961-3
(S) 4-Bromofluorobenzene	*118*			*64.0-132*		*05/23/2018 14:52*	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
(S) 4-Bromofluorobenzene	*105*			*64.0-132*		*05/24/2018 16:21*	WG1114961-3

Wet Chemistry by Method 7199

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hexavalent Chromium-Low Level	0.0000857		0.0000200	0.0000600	1	05/22/2018 14:55	WG1113326

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury,Dissolved	U		0.0000490	0.000200	1	05/24/2018 10:10	WG1115429

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:06	WG1115384
Cadmium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:06	WG1115384
Chromium,Dissolved	U		0.00140	0.0100	1	05/25/2018 13:06	WG1115384
Copper,Dissolved	U		0.00530	0.0100	1	05/25/2018 13:06	WG1115384
Nickel,Dissolved	U		0.00490	0.0100	1	05/25/2018 13:06	WG1115384
Selenium,Dissolved	U		0.00740	0.0100	1	05/25/2018 13:06	WG1115384
Silver,Dissolved	U		0.00280	0.00500	1	05/25/2018 13:06	WG1115384
Zinc,Dissolved	0.0155	J	0.00590	0.0500	1	05/25/2018 13:06	WG1115384

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	U		0.000754	0.00200	1	05/25/2018 18:20	WG1115388
Arsenic,Dissolved	0.000637	J	0.000250	0.00200	1	05/25/2018 18:20	WG1115388
Lead,Dissolved	U		0.000240	0.00200	1	05/25/2018 18:20	WG1115388
Thallium,Dissolved	U		0.000190	0.00200	1	05/25/2018 18:20	WG1115388

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	U		0.0100	0.0500	1	05/22/2018 16:50	WG1114510
Acrolein	U		0.00887	0.0500	1	05/22/2018 16:50	WG1114510
Acrylonitrile	U		0.00187	0.0100	1	05/22/2018 16:50	WG1114510
Benzene	U		0.000331	0.00100	1	05/22/2018 16:50	WG1114510
Bromobenzene	U		0.000352	0.00100	1	05/22/2018 16:50	WG1114510
Bromodichloromethane	U		0.000380	0.00100	1	05/22/2018 16:50	WG1114510
Bromoform	U		0.000469	0.00100	1	05/22/2018 16:50	WG1114510
Bromomethane	U		0.000866	0.00500	1	05/22/2018 16:50	WG1114510
n-Butylbenzene	U		0.000361	0.00100	1	05/22/2018 16:50	WG1114510
sec-Butylbenzene	U		0.000365	0.00100	1	05/22/2018 16:50	WG1114510
tert-Butylbenzene	U		0.000399	0.00100	1	05/22/2018 16:50	WG1114510
Carbon tetrachloride	U		0.000379	0.00100	1	05/22/2018 16:50	WG1114510
Chlorobenzene	U		0.000348	0.00100	1	05/22/2018 16:50	WG1114510
Chlorodibromomethane	U		0.000327	0.00100	1	05/22/2018 16:50	WG1114510
Chloroethane	U		0.000453	0.00500	1	05/22/2018 16:50	WG1114510
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	05/22/2018 16:50	WG1114510
Chloroform	U		0.000324	0.00500	1	05/22/2018 16:50	WG1114510
Chloromethane	U		0.000276	0.00250	1	05/22/2018 16:50	WG1114510
2-Chlorotoluene	U		0.000375	0.00100	1	05/22/2018 16:50	WG1114510
4-Chlorotoluene	U		0.000351	0.00100	1	05/22/2018 16:50	WG1114510
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	05/22/2018 16:50	WG1114510
1,2-Dibromoethane	U		0.000381	0.00100	1	05/22/2018 16:50	WG1114510
Dibromomethane	U		0.000346	0.00100	1	05/22/2018 16:50	WG1114510

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dichlorobenzene	U		0.000349	0.00100	1	05/22/2018 16:50	WG1114510
1,3-Dichlorobenzene	U		0.000220	0.00100	1	05/22/2018 16:50	WG1114510
1,4-Dichlorobenzene	U		0.000274	0.00100	1	05/22/2018 16:50	WG1114510
Dichlorodifluoromethane	U		0.000551	0.00500	1	05/22/2018 16:50	WG1114510
1,1-Dichloroethane	U		0.000259	0.00100	1	05/22/2018 16:50	WG1114510
1,2-Dichloroethane	U		0.000361	0.00100	1	05/22/2018 16:50	WG1114510
1,1-Dichloroethene	U		0.000398	0.00100	1	05/22/2018 16:50	WG1114510
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	05/22/2018 16:50	WG1114510
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	05/22/2018 16:50	WG1114510
1,2-Dichloropropane	U		0.000306	0.00100	1	05/22/2018 16:50	WG1114510
1,1-Dichloropropene	U		0.000352	0.00100	1	05/22/2018 16:50	WG1114510
1,3-Dichloropropane	U		0.000366	0.00100	1	05/22/2018 16:50	WG1114510
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	05/22/2018 16:50	WG1114510
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	05/22/2018 16:50	WG1114510
2,2-Dichloropropane	U		0.000321	0.00100	1	05/22/2018 16:50	WG1114510
Di-isopropyl ether	U		0.000320	0.00100	1	05/22/2018 16:50	WG1114510
Ethylbenzene	U		0.000384	0.00100	1	05/22/2018 16:50	WG1114510
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	05/22/2018 16:50	WG1114510
Isopropylbenzene	U		0.000326	0.00100	1	05/22/2018 16:50	WG1114510
p-Isopropyltoluene	U		0.000350	0.00100	1	05/22/2018 16:50	WG1114510
2-Butanone (MEK)	U		0.00393	0.0100	1	05/22/2018 16:50	WG1114510
Methylene Chloride	U		0.00100	0.00500	1	05/22/2018 16:50	WG1114510
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	05/22/2018 16:50	WG1114510
Methyl tert-butyl ether	U		0.000367	0.00100	1	05/22/2018 16:50	WG1114510
Naphthalene	U	J3	0.00100	0.00500	1	05/22/2018 16:50	WG1114510
n-Propylbenzene	U		0.000349	0.00100	1	05/22/2018 16:50	WG1114510
Styrene	U		0.000307	0.00100	1	05/22/2018 16:50	WG1114510
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	05/22/2018 16:50	WG1114510
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	05/22/2018 16:50	WG1114510
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	05/22/2018 16:50	WG1114510
Tetrachloroethene	U		0.000372	0.00100	1	05/22/2018 16:50	WG1114510
Toluene	U		0.000412	0.00100	1	05/22/2018 16:50	WG1114510
1,2,3-Trichlorobenzene	U	J3	0.000230	0.00100	1	05/22/2018 16:50	WG1114510
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	05/22/2018 16:50	WG1114510
1,1,1-Trichloroethane	U		0.000319	0.00100	1	05/22/2018 16:50	WG1114510
1,1,2-Trichloroethane	U		0.000383	0.00100	1	05/22/2018 16:50	WG1114510
Trichloroethene	0.0766		0.000398	0.00100	1	05/22/2018 16:50	WG1114510
Trichlorofluoromethane	U		0.00120	0.00500	1	05/22/2018 16:50	WG1114510
1,2,3-Trichloropropane	U		0.000807	0.00250	1	05/22/2018 16:50	WG1114510
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	05/22/2018 16:50	WG1114510
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	05/22/2018 16:50	WG1114510
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	05/22/2018 16:50	WG1114510
Vinyl chloride	U		0.000259	0.00100	1	05/22/2018 16:50	WG1114510
Xylenes, Total	U		0.00106	0.00300	1	05/22/2018 16:50	WG1114510
(S) Toluene-d8	*103*			*80.0-120*		*05/22/2018 16:50*	WG1114510
(S) Dibromofluoromethane	*93.0*			*76.0-123*		*05/22/2018 16:50*	WG1114510
(S) 4-Bromofluorobenzene	*94.5*			*80.0-120*		*05/22/2018 16:50*	WG1114510

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	76.8		1	05/24/2018 11:04	WG1115189

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.834	2.61	1	05/24/2018 13:40	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.69	T8	1	05/23/2018 08:52	WG1114755

Sample Narrative:

L995461-04 WG1114755: 8.69 at 21.5C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0769		0.00365	0.0261	1	05/24/2018 08:12	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.977	2.61	1	05/24/2018 12:10	WG1114824
Arsenic	8.78		0.847	2.61	1	05/24/2018 12:10	WG1114824
Beryllium	1.38		0.0912	0.261	1	05/24/2018 12:10	WG1114824
Cadmium	0.331	J	0.0912	0.651	1	05/24/2018 12:10	WG1114824
Chromium	31.1		0.182	1.30	1	05/24/2018 12:10	WG1114824
Copper	66.5		0.690	2.61	1	05/24/2018 12:10	WG1114824
Lead	51.5		0.247	0.651	1	05/24/2018 12:10	WG1114824
Nickel	25.4		0.638	2.61	1	05/24/2018 12:10	WG1114824
Selenium	U		0.964	2.61	1	05/24/2018 12:10	WG1114824
Silver	U		0.365	1.30	1	05/24/2018 12:10	WG1114824
Thallium	U		0.847	2.61	1	05/24/2018 12:10	WG1114824
Zinc	126		0.768	6.51	1	05/24/2018 12:10	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J3	0.0178	0.0326	1	05/23/2018 15:13	WG1114961
Acrylonitrile	U		0.00247	0.0163	1	05/23/2018 15:13	WG1114961
Benzene	U		0.000521	0.00130	1	05/23/2018 15:13	WG1114961
Bromobenzene	U		0.00137	0.0163	1	05/23/2018 15:13	WG1114961
Bromodichloromethane	U		0.00103	0.00326	1	05/23/2018 15:13	WG1114961
Bromoform	U		0.00779	0.0326	1	05/23/2018 15:13	WG1114961
Bromomethane	U		0.00482	0.0163	1	05/23/2018 15:13	WG1114961
n-Butylbenzene	U		0.00500	0.0163	1	05/23/2018 15:13	WG1114961
sec-Butylbenzene	U		0.00330	0.0163	1	05/23/2018 15:13	WG1114961
tert-Butylbenzene	U		0.00202	0.00651	1	05/23/2018 15:13	WG1114961
Carbon tetrachloride	U		0.00141	0.00651	1	05/23/2018 15:13	WG1114961
Chlorobenzene	U		0.000746	0.00326	1	05/23/2018 15:13	WG1114961
Chlorodibromomethane	U		0.000586	0.00326	1	05/23/2018 15:13	WG1114961
Chloroethane	U		0.00141	0.00651	1	05/23/2018 15:13	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000541	0.00326	1	05/23/2018 15:13	WG1114961
Chloromethane	U		0.00181	0.0163	1	05/23/2018 15:13	WG1114961
2-Chlorotoluene	U		0.00120	0.00326	1	05/23/2018 15:13	WG1114961
4-Chlorotoluene	U	J4	0.00147	0.00651	1	05/23/2018 15:13	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00664	0.0326	1	05/23/2018 15:13	WG1114961
1,2-Dibromoethane	U		0.000684	0.00326	1	05/23/2018 15:13	WG1114961
Dibromomethane	U		0.00130	0.00651	1	05/23/2018 15:13	WG1114961
1,2-Dichlorobenzene	U		0.00189	0.00651	1	05/23/2018 15:13	WG1114961
1,3-Dichlorobenzene	U		0.00221	0.00651	1	05/23/2018 15:13	WG1114961
1,4-Dichlorobenzene	0.00371	J	0.00257	0.00651	1	05/23/2018 15:13	WG1114961
Dichlorodifluoromethane	U		0.00107	0.00326	1	05/23/2018 15:13	WG1114961
1,1-Dichloroethane	U		0.000749	0.00326	1	05/23/2018 15:13	WG1114961
1,2-Dichloroethane	U		0.000619	0.00326	1	05/23/2018 15:13	WG1114961
1,1-Dichloroethene	U		0.000651	0.00326	1	05/23/2018 15:13	WG1114961
cis-1,2-Dichloroethene	U		0.000899	0.00326	1	05/23/2018 15:13	WG1114961
trans-1,2-Dichloroethene	U		0.00186	0.00651	1	05/23/2018 15:13	WG1114961
1,2-Dichloropropane	U		0.00165	0.00651	1	05/24/2018 14:21	WG1114961-3
1,1-Dichloropropene	U		0.000912	0.00326	1	05/23/2018 15:13	WG1114961
1,3-Dichloropropane	U		0.00228	0.00651	1	05/23/2018 15:13	WG1114961
cis-1,3-Dichloropropene	U		0.000883	0.00326	1	05/23/2018 15:13	WG1114961
trans-1,3-Dichloropropene	U		0.00199	0.00651	1	05/23/2018 15:13	WG1114961
2,2-Dichloropropane	U		0.00103	0.00326	1	05/23/2018 15:13	WG1114961
Di-isopropyl ether	U		0.000456	0.00130	1	05/23/2018 15:13	WG1114961
Ethylbenzene	U		0.000690	0.00326	1	05/23/2018 15:13	WG1114961
Hexachloro-1,3-butadiene	U		0.0165	0.0326	1	05/23/2018 15:13	WG1114961
Isopropylbenzene	U		0.00112	0.00326	1	05/23/2018 15:13	WG1114961
p-Isopropyltoluene	U		0.00303	0.00651	1	05/23/2018 15:13	WG1114961
2-Butanone (MEK)	U		0.0163	0.0326	1	05/23/2018 15:13	WG1114961
Methylene Chloride	U		0.00865	0.0326	1	05/23/2018 15:13	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0130	0.0326	1	05/23/2018 15:13	WG1114961
Methyl tert-butyl ether	U		0.000384	0.00130	1	05/23/2018 15:13	WG1114961
Naphthalene	U		0.00406	0.0163	1	05/23/2018 15:13	WG1114961
n-Propylbenzene	U		0.00154	0.00651	1	05/23/2018 15:13	WG1114961
Styrene	U		0.00356	0.0163	1	05/23/2018 15:13	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000651	0.00326	1	05/23/2018 15:13	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000508	0.00326	1	05/23/2018 15:13	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000879	0.00326	1	05/23/2018 15:13	WG1114961
Tetrachloroethene	U		0.000912	0.00326	1	05/23/2018 15:13	WG1114961
Toluene	U		0.00163	0.00651	1	05/23/2018 15:13	WG1114961
1,2,3-Trichlorobenzene	U		0.000814	0.00326	1	05/23/2018 15:13	WG1114961
1,2,4-Trichlorobenzene	U		0.00628	0.0163	1	05/23/2018 15:13	WG1114961
1,1,1-Trichloroethane	U		0.000358	0.00326	1	05/23/2018 15:13	WG1114961
1,1,2-Trichloroethane	U		0.00115	0.00326	1	05/23/2018 15:13	WG1114961
Trichloroethene	0.0214		0.000521	0.00130	1	05/24/2018 14:21	WG1114961-3
Trichlorofluoromethane	U		0.000651	0.00326	1	05/23/2018 15:13	WG1114961
1,2,3-Trichloropropane	U		0.00664	0.0163	1	05/23/2018 15:13	WG1114961
1,2,4-Trimethylbenzene	0.00179	J	0.00151	0.00651	1	05/23/2018 15:13	WG1114961
1,2,3-Trimethylbenzene	U		0.00150	0.00651	1	05/23/2018 15:13	WG1114961
1,3,5-Trimethylbenzene	U		0.00141	0.00651	1	05/23/2018 15:13	WG1114961
Vinyl chloride	U		0.000890	0.00326	1	05/23/2018 15:13	WG1114961
Xylenes, Total	U		0.00623	0.00847	1	05/23/2018 15:13	WG1114961
(S) Toluene-d8	*117*			*80.0-120*		*05/23/2018 15:13*	WG1114961
(S) Toluene-d8	*106*			*80.0-120*		*05/24/2018 14:21*	WG1114961-3
(S) Dibromofluoromethane	*92.1*			*74.0-131*		*05/23/2018 15:13*	WG1114961
(S) Dibromofluoromethane	*89.8*			*74.0-131*		*05/24/2018 14:21*	WG1114961-3
(S) 4-Bromofluorobenzene	*115*			*64.0-132*		*05/23/2018 15:13*	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
(S) 4-Bromofluorobenzene	*108*			*64.0-132*		*05/24/2018 14:21*	WG1114961-3

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	89.9		1	05/24/2018 11:04	WG1115189

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.712	2.22	1	05/24/2018 13:42	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	10.7	T8	1	05/23/2018 08:52	WG1114755

Sample Narrative:

L995461-05 WG1114755: 10.66 at 21.3C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.674		0.00311	0.0222	1	05/24/2018 08:15	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.834	2.22	1	05/24/2018 12:20	WG1114824
Arsenic	6.05		0.723	2.22	1	05/24/2018 12:20	WG1114824
Beryllium	0.612		0.0779	0.222	1	05/24/2018 12:20	WG1114824
Cadmium	0.819		0.0779	0.556	1	05/24/2018 12:20	WG1114824
Chromium	16.3		0.156	1.11	1	05/24/2018 12:20	WG1114824
Copper	25.6		0.589	2.22	1	05/24/2018 12:20	WG1114824
Lead	143		0.211	0.556	1	05/24/2018 12:20	WG1114824
Nickel	11.0		0.545	2.22	1	05/24/2018 12:20	WG1114824
Selenium	U		0.823	2.22	1	05/24/2018 12:20	WG1114824
Silver	U		0.311	1.11	1	05/24/2018 12:20	WG1114824
Thallium	U		0.723	2.22	1	05/24/2018 12:20	WG1114824
Zinc	99.5		0.656	5.56	1	05/24/2018 12:20	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	0.0169	J J3	0.0152	0.0278	1	05/23/2018 15:34	WG1114961
Acrylonitrile	U		0.00211	0.0139	1	05/23/2018 15:34	WG1114961
Benzene	U		0.000445	0.00111	1	05/23/2018 15:34	WG1114961
Bromobenzene	U		0.00117	0.0139	1	05/23/2018 15:34	WG1114961
Bromodichloromethane	U		0.000876	0.00278	1	05/23/2018 15:34	WG1114961
Bromoform	U		0.00665	0.0278	1	05/23/2018 15:34	WG1114961
Bromomethane	U		0.00411	0.0139	1	05/23/2018 15:34	WG1114961
n-Butylbenzene	U		0.00427	0.0139	1	05/23/2018 15:34	WG1114961
sec-Butylbenzene	U		0.00281	0.0139	1	05/23/2018 15:34	WG1114961
tert-Butylbenzene	U		0.00172	0.00556	1	05/23/2018 15:34	WG1114961
Carbon tetrachloride	U		0.00120	0.00556	1	05/23/2018 15:34	WG1114961
Chlorobenzene	U		0.000637	0.00278	1	05/23/2018 15:34	WG1114961
Chlorodibromomethane	U		0.000500	0.00278	1	05/23/2018 15:34	WG1114961
Chloroethane	U		0.00120	0.00556	1	05/23/2018 15:34	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	0.000929	J	0.000462	0.00278	1	05/23/2018 15:34	WG1114961
Chloromethane	U		0.00155	0.0139	1	05/23/2018 15:34	WG1114961
2-Chlorotoluene	U		0.00102	0.00278	1	05/23/2018 15:34	WG1114961
4-Chlorotoluene	U	J4	0.00126	0.00556	1	05/23/2018 15:34	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00567	0.0278	1	05/23/2018 15:34	WG1114961
1,2-Dibromoethane	U		0.000584	0.00278	1	05/23/2018 15:34	WG1114961
Dibromomethane	U		0.00111	0.00556	1	05/23/2018 15:34	WG1114961
1,2-Dichlorobenzene	U		0.00161	0.00556	1	05/23/2018 15:34	WG1114961
1,3-Dichlorobenzene	U		0.00189	0.00556	1	05/23/2018 15:34	WG1114961
1,4-Dichlorobenzene	0.00361	J	0.00219	0.00556	1	05/23/2018 15:34	WG1114961
Dichlorodifluoromethane	U		0.000910	0.00278	1	05/23/2018 15:34	WG1114961
1,1-Dichloroethane	U		0.000639	0.00278	1	05/23/2018 15:34	WG1114961
1,2-Dichloroethane	U		0.000528	0.00278	1	05/23/2018 15:34	WG1114961
1,1-Dichloroethene	U		0.000556	0.00278	1	05/23/2018 15:34	WG1114961
cis-1,2-Dichloroethene	U		0.000767	0.00278	1	05/23/2018 15:34	WG1114961
trans-1,2-Dichloroethene	U		0.00159	0.00556	1	05/23/2018 15:34	WG1114961
1,2-Dichloropropane	0.0574		0.00141	0.00556	1	05/23/2018 15:34	WG1114961
1,1-Dichloropropene	U		0.000779	0.00278	1	05/23/2018 15:34	WG1114961
1,3-Dichloropropane	U		0.00195	0.00556	1	05/23/2018 15:34	WG1114961
cis-1,3-Dichloropropene	U		0.000754	0.00278	1	05/23/2018 15:34	WG1114961
trans-1,3-Dichloropropene	U		0.00170	0.00556	1	05/23/2018 15:34	WG1114961
2,2-Dichloropropane	U		0.000882	0.00278	1	05/23/2018 15:34	WG1114961
Di-isopropyl ether	U		0.000389	0.00111	1	05/23/2018 15:34	WG1114961
Ethylbenzene	U		0.000589	0.00278	1	05/23/2018 15:34	WG1114961
Hexachloro-1,3-butadiene	U		0.0141	0.0278	1	05/23/2018 15:34	WG1114961
Isopropylbenzene	U		0.000960	0.00278	1	05/23/2018 15:34	WG1114961
p-Isopropyltoluene	U		0.00259	0.00556	1	05/23/2018 15:34	WG1114961
2-Butanone (MEK)	U		0.0139	0.0278	1	05/23/2018 15:34	WG1114961
Methylene Chloride	U		0.00738	0.0278	1	05/23/2018 15:34	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0111	0.0278	1	05/23/2018 15:34	WG1114961
Methyl tert-butyl ether	U		0.000328	0.00111	1	05/23/2018 15:34	WG1114961
Naphthalene	0.00948	J	0.00347	0.0139	1	05/23/2018 15:34	WG1114961
n-Propylbenzene	U		0.00131	0.00556	1	05/23/2018 15:34	WG1114961
Styrene	U		0.00304	0.0139	1	05/23/2018 15:34	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000556	0.00278	1	05/23/2018 15:34	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000434	0.00278	1	05/23/2018 15:34	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000751	0.00278	1	05/23/2018 15:34	WG1114961
Tetrachloroethene	U		0.000779	0.00278	1	05/23/2018 15:34	WG1114961
Toluene	0.0172		0.00139	0.00556	1	05/23/2018 15:34	WG1114961
1,2,3-Trichlorobenzene	U		0.000695	0.00278	1	05/23/2018 15:34	WG1114961
1,2,4-Trichlorobenzene	U		0.00536	0.0139	1	05/23/2018 15:34	WG1114961
1,1,1-Trichloroethane	U		0.000306	0.00278	1	05/23/2018 15:34	WG1114961
1,1,2-Trichloroethane	U		0.000982	0.00278	1	05/23/2018 15:34	WG1114961
Trichloroethene	0.986		0.000445	0.00111	1	05/23/2018 15:34	WG1114961
Trichlorofluoromethane	U		0.000556	0.00278	1	05/23/2018 15:34	WG1114961
1,2,3-Trichloropropane	U		0.00567	0.0139	1	05/23/2018 15:34	WG1114961
1,2,4-Trimethylbenzene	0.0102		0.00129	0.00556	1	05/23/2018 15:34	WG1114961
1,2,3-Trimethylbenzene	0.00425	J	0.00128	0.00556	1	05/23/2018 15:34	WG1114961
1,3,5-Trimethylbenzene	0.00309	J	0.00120	0.00556	1	05/23/2018 15:34	WG1114961
Vinyl chloride	U		0.000760	0.00278	1	05/23/2018 15:34	WG1114961
Xylenes, Total	0.0301		0.00532	0.00723	1	05/23/2018 15:34	WG1114961
(S) Toluene-d8	*115*			*80.0-120*		*05/23/2018 15:34*	WG1114961
(S) Dibromofluoromethane	*93.2*			*74.0-131*		*05/23/2018 15:34*	WG1114961
(S) 4-Bromofluorobenzene	*112*			*64.0-132*		*05/23/2018 15:34*	WG1114961

Wet Chemistry by Method 7199

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hexavalent Chromium-Low Level	0.000217		0.0000200	0.0000600	1	05/22/2018 15:03	WG1113326

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury,Dissolved	U		0.0000490	0.000200	1	05/24/2018 10:18	WG1115429

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:08	WG1115384
Cadmium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:08	WG1115384
Chromium,Dissolved	U		0.00140	0.0100	1	05/25/2018 13:08	WG1115384
Copper,Dissolved	U		0.00530	0.0100	1	05/25/2018 13:08	WG1115384
Nickel,Dissolved	U		0.00490	0.0100	1	05/25/2018 13:08	WG1115384
Selenium,Dissolved	U		0.00740	0.0100	1	05/25/2018 13:08	WG1115384
Silver,Dissolved	U		0.00280	0.00500	1	05/25/2018 13:08	WG1115384
Zinc,Dissolved	0.0193	J	0.00590	0.0500	1	05/25/2018 13:08	WG1115384

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	0.000851	J	0.000754	0.00200	1	05/25/2018 18:24	WG1115388
Arsenic,Dissolved	0.00111	J	0.000250	0.00200	1	05/25/2018 18:24	WG1115388
Lead,Dissolved	U		0.000240	0.00200	1	05/25/2018 18:24	WG1115388
Thallium,Dissolved	U		0.000190	0.00200	1	05/25/2018 18:24	WG1115388

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	U		0.0100	0.0500	1	05/22/2018 17:11	WG1114510
Acrolein	U		0.00887	0.0500	1	05/22/2018 17:11	WG1114510
Acrylonitrile	U		0.00187	0.0100	1	05/22/2018 17:11	WG1114510
Benzene	U		0.000331	0.00100	1	05/22/2018 17:11	WG1114510
Bromobenzene	U		0.000352	0.00100	1	05/22/2018 17:11	WG1114510
Bromodichloromethane	U		0.000380	0.00100	1	05/22/2018 17:11	WG1114510
Bromoform	U		0.000469	0.00100	1	05/22/2018 17:11	WG1114510
Bromomethane	U		0.000866	0.00500	1	05/22/2018 17:11	WG1114510
n-Butylbenzene	U		0.000361	0.00100	1	05/22/2018 17:11	WG1114510
sec-Butylbenzene	U		0.000365	0.00100	1	05/22/2018 17:11	WG1114510
tert-Butylbenzene	U		0.000399	0.00100	1	05/22/2018 17:11	WG1114510
Carbon tetrachloride	U		0.000379	0.00100	1	05/22/2018 17:11	WG1114510
Chlorobenzene	U		0.000348	0.00100	1	05/22/2018 17:11	WG1114510
Chlorodibromomethane	U		0.000327	0.00100	1	05/22/2018 17:11	WG1114510
Chloroethane	U		0.000453	0.00500	1	05/22/2018 17:11	WG1114510
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	05/22/2018 17:11	WG1114510
Chloroform	U		0.000324	0.00500	1	05/22/2018 17:11	WG1114510
Chloromethane	U		0.000276	0.00250	1	05/22/2018 17:11	WG1114510
2-Chlorotoluene	U		0.000375	0.00100	1	05/22/2018 17:11	WG1114510
4-Chlorotoluene	U		0.000351	0.00100	1	05/22/2018 17:11	WG1114510
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	05/22/2018 17:11	WG1114510
1,2-Dibromoethane	U		0.000381	0.00100	1	05/22/2018 17:11	WG1114510
Dibromomethane	U		0.000346	0.00100	1	05/22/2018 17:11	WG1114510

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dichlorobenzene	U		0.000349	0.00100	1	05/22/2018 17:11	WG1114510
1,3-Dichlorobenzene	U		0.000220	0.00100	1	05/22/2018 17:11	WG1114510
1,4-Dichlorobenzene	U		0.000274	0.00100	1	05/22/2018 17:11	WG1114510
Dichlorodifluoromethane	U		0.000551	0.00500	1	05/22/2018 17:11	WG1114510
1,1-Dichloroethane	U		0.000259	0.00100	1	05/22/2018 17:11	WG1114510
1,2-Dichloroethane	U		0.000361	0.00100	1	05/22/2018 17:11	WG1114510
1,1-Dichloroethene	U		0.000398	0.00100	1	05/22/2018 17:11	WG1114510
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	05/22/2018 17:11	WG1114510
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	05/22/2018 17:11	WG1114510
1,2-Dichloropropane	U		0.000306	0.00100	1	05/22/2018 17:11	WG1114510
1,1-Dichloropropene	U		0.000352	0.00100	1	05/22/2018 17:11	WG1114510
1,3-Dichloropropane	U		0.000366	0.00100	1	05/22/2018 17:11	WG1114510
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	05/22/2018 17:11	WG1114510
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	05/22/2018 17:11	WG1114510
2,2-Dichloropropane	U		0.000321	0.00100	1	05/22/2018 17:11	WG1114510
Di-isopropyl ether	U		0.000320	0.00100	1	05/22/2018 17:11	WG1114510
Ethylbenzene	U		0.000384	0.00100	1	05/22/2018 17:11	WG1114510
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	05/22/2018 17:11	WG1114510
Isopropylbenzene	U		0.000326	0.00100	1	05/22/2018 17:11	WG1114510
p-Isopropyltoluene	U		0.000350	0.00100	1	05/22/2018 17:11	WG1114510
2-Butanone (MEK)	U		0.00393	0.0100	1	05/22/2018 17:11	WG1114510
Methylene Chloride	U		0.00100	0.00500	1	05/22/2018 17:11	WG1114510
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	05/22/2018 17:11	WG1114510
Methyl tert-butyl ether	U		0.000367	0.00100	1	05/22/2018 17:11	WG1114510
Naphthalene	U	J3	0.00100	0.00500	1	05/22/2018 17:11	WG1114510
n-Propylbenzene	U		0.000349	0.00100	1	05/22/2018 17:11	WG1114510
Styrene	U		0.000307	0.00100	1	05/22/2018 17:11	WG1114510
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	05/22/2018 17:11	WG1114510
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	05/22/2018 17:11	WG1114510
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	05/22/2018 17:11	WG1114510
Tetrachloroethene	U		0.000372	0.00100	1	05/22/2018 17:11	WG1114510
Toluene	U		0.000412	0.00100	1	05/22/2018 17:11	WG1114510
1,2,3-Trichlorobenzene	U	J3	0.000230	0.00100	1	05/22/2018 17:11	WG1114510
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	05/22/2018 17:11	WG1114510
1,1,1-Trichloroethane	U		0.000319	0.00100	1	05/22/2018 17:11	WG1114510
1,1,2-Trichloroethane	U		0.000383	0.00100	1	05/22/2018 17:11	WG1114510
Trichloroethene	0.00888		0.000398	0.00100	1	05/22/2018 17:11	WG1114510
Trichlorofluoromethane	U		0.00120	0.00500	1	05/22/2018 17:11	WG1114510
1,2,3-Trichloropropane	U		0.000807	0.00250	1	05/22/2018 17:11	WG1114510
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	05/22/2018 17:11	WG1114510
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	05/22/2018 17:11	WG1114510
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	05/22/2018 17:11	WG1114510
Vinyl chloride	U		0.000259	0.00100	1	05/22/2018 17:11	WG1114510
Xylenes, Total	U		0.00106	0.00300	1	05/22/2018 17:11	WG1114510
(S) Toluene-d8	*100*			*80.0-120*		*05/22/2018 17:11*	WG1114510
(S) Dibromofluoromethane	*88.7*			*76.0-123*		*05/22/2018 17:11*	WG1114510
(S) 4-Bromofluorobenzene	*93.6*			*80.0-120*		*05/22/2018 17:11*	WG1114510

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	92.4		1	05/24/2018 11:04	WG1115189

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.692	2.16	1	05/24/2018 13:42	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.98	T8	1	05/23/2018 08:52	WG1114755

Sample Narrative:

L995461-07 WG1114755: 7.98 at 21.6C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0278		0.00303	0.0216	1	05/24/2018 08:21	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.811	2.16	1	05/24/2018 12:23	WG1114824
Arsenic	3.46		0.703	2.16	1	05/24/2018 12:23	WG1114824
Beryllium	0.353		0.0757	0.216	1	05/24/2018 12:23	WG1114824
Cadmium	0.430	J	0.0757	0.541	1	05/24/2018 12:23	WG1114824
Chromium	14.0		0.151	1.08	1	05/24/2018 12:23	WG1114824
Copper	11.5		0.573	2.16	1	05/24/2018 12:23	WG1114824
Lead	36.5		0.206	0.541	1	05/24/2018 12:23	WG1114824
Nickel	9.15		0.530	2.16	1	05/24/2018 12:23	WG1114824
Selenium	U		0.800	2.16	1	05/24/2018 12:23	WG1114824
Silver	U		0.303	1.08	1	05/24/2018 12:23	WG1114824
Thallium	U		0.703	2.16	1	05/24/2018 12:23	WG1114824
Zinc	52.4		0.638	5.41	1	05/24/2018 12:23	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J3	0.0175	0.0319	1.18	05/23/2018 15:55	WG1114961
Acrylonitrile	U		0.00242	0.0160	1.18	05/23/2018 15:55	WG1114961
Benzene	U		0.000511	0.00128	1.18	05/23/2018 15:55	WG1114961
Bromobenzene	U		0.00134	0.0160	1.18	05/23/2018 15:55	WG1114961
Bromodichloromethane	U		0.00101	0.00319	1.18	05/23/2018 15:55	WG1114961
Bromoform	U		0.00764	0.0319	1.18	05/23/2018 15:55	WG1114961
Bromomethane	U		0.00473	0.0160	1.18	05/23/2018 15:55	WG1114961
n-Butylbenzene	U		0.00490	0.0160	1.18	05/23/2018 15:55	WG1114961
sec-Butylbenzene	U		0.00322	0.0160	1.18	05/23/2018 15:55	WG1114961
tert-Butylbenzene	U		0.00198	0.00638	1.18	05/23/2018 15:55	WG1114961
Carbon tetrachloride	U		0.00137	0.00638	1.18	05/23/2018 15:55	WG1114961
Chlorobenzene	U		0.000731	0.00319	1.18	05/23/2018 15:55	WG1114961
Chlorodibromomethane	U		0.000574	0.00319	1.18	05/23/2018 15:55	WG1114961
Chloroethane	U		0.00137	0.00638	1.18	05/23/2018 15:55	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000530	0.00319	1.18	05/23/2018 15:55	WG1114961
Chloromethane	U		0.00177	0.0160	1.18	05/23/2018 15:55	WG1114961
2-Chlorotoluene	U		0.00117	0.00319	1.18	05/23/2018 15:55	WG1114961
4-Chlorotoluene	U	J4	0.00144	0.00638	1.18	05/23/2018 15:55	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00651	0.0319	1.18	05/23/2018 15:55	WG1114961
1,2-Dibromoethane	U		0.000671	0.00319	1.18	05/23/2018 15:55	WG1114961
Dibromomethane	U		0.00128	0.00638	1.18	05/23/2018 15:55	WG1114961
1,2-Dichlorobenzene	U		0.00185	0.00638	1.18	05/23/2018 15:55	WG1114961
1,3-Dichlorobenzene	U		0.00217	0.00638	1.18	05/23/2018 15:55	WG1114961
1,4-Dichlorobenzene	0.00604	J	0.00251	0.00638	1.18	05/23/2018 15:55	WG1114961
Dichlorodifluoromethane	U		0.00104	0.00319	1.18	05/23/2018 15:55	WG1114961
1,1-Dichloroethane	U		0.000733	0.00319	1.18	05/23/2018 15:55	WG1114961
1,2-Dichloroethane	0.00115	J	0.000606	0.00319	1.18	05/23/2018 15:55	WG1114961
1,1-Dichloroethene	U		0.000638	0.00319	1.18	05/23/2018 15:55	WG1114961
cis-1,2-Dichloroethene	U		0.000881	0.00319	1.18	05/23/2018 15:55	WG1114961
trans-1,2-Dichloroethene	U		0.00183	0.00638	1.18	05/23/2018 15:55	WG1114961
1,2-Dichloropropane	U		0.00162	0.00638	1.18	05/23/2018 15:55	WG1114961
1,1-Dichloropropene	U		0.000894	0.00319	1.18	05/23/2018 15:55	WG1114961
1,3-Dichloropropane	U		0.00223	0.00638	1.18	05/23/2018 15:55	WG1114961
cis-1,3-Dichloropropene	U		0.000865	0.00319	1.18	05/23/2018 15:55	WG1114961
trans-1,3-Dichloropropene	U		0.00195	0.00638	1.18	05/23/2018 15:55	WG1114961
2,2-Dichloropropane	U		0.00101	0.00319	1.18	05/23/2018 15:55	WG1114961
Di-isopropyl ether	U		0.000447	0.00128	1.18	05/23/2018 15:55	WG1114961
Ethylbenzene	U		0.000676	0.00319	1.18	05/23/2018 15:55	WG1114961
Hexachloro-1,3-butadiene	U		0.0162	0.0319	1.18	05/23/2018 15:55	WG1114961
Isopropylbenzene	U		0.00110	0.00319	1.18	05/23/2018 15:55	WG1114961
p-Isopropyltoluene	U		0.00297	0.00638	1.18	05/23/2018 15:55	WG1114961
2-Butanone (MEK)	U		0.0160	0.0319	1.18	05/23/2018 15:55	WG1114961
Methylene Chloride	U		0.00848	0.0319	1.18	05/23/2018 15:55	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0128	0.0319	1.18	05/23/2018 15:55	WG1114961
Methyl tert-butyl ether	U		0.000376	0.00128	1.18	05/23/2018 15:55	WG1114961
Naphthalene	U		0.00398	0.0160	1.18	05/23/2018 15:55	WG1114961
n-Propylbenzene	U		0.00150	0.00638	1.18	05/23/2018 15:55	WG1114961
Styrene	U		0.00348	0.0160	1.18	05/23/2018 15:55	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000638	0.00319	1.18	05/23/2018 15:55	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000498	0.00319	1.18	05/23/2018 15:55	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000861	0.00319	1.18	05/23/2018 15:55	WG1114961
Tetrachloroethene	U		0.000894	0.00319	1.18	05/23/2018 15:55	WG1114961
Toluene	0.00748		0.00160	0.00638	1.18	05/23/2018 15:55	WG1114961
1,2,3-Trichlorobenzene	U		0.000798	0.00319	1.18	05/23/2018 15:55	WG1114961
1,2,4-Trichlorobenzene	U		0.00616	0.0160	1.18	05/23/2018 15:55	WG1114961
1,1,1-Trichloroethane	U		0.000350	0.00319	1.18	05/23/2018 15:55	WG1114961
1,1,2-Trichloroethane	U		0.00113	0.00319	1.18	05/23/2018 15:55	WG1114961
Trichloroethene	0.00915		0.000506	0.00127	1.17	05/24/2018 14:41	WG1114961-3
Trichlorofluoromethane	U		0.000638	0.00319	1.18	05/23/2018 15:55	WG1114961
1,2,3-Trichloropropane	U		0.00651	0.0160	1.18	05/23/2018 15:55	WG1114961
1,2,4-Trimethylbenzene	0.00403	J	0.00148	0.00638	1.18	05/23/2018 15:55	WG1114961
1,2,3-Trimethylbenzene	0.00161	J	0.00147	0.00638	1.18	05/23/2018 15:55	WG1114961
1,3,5-Trimethylbenzene	U		0.00137	0.00638	1.18	05/23/2018 15:55	WG1114961
Vinyl chloride	U		0.000872	0.00319	1.18	05/23/2018 15:55	WG1114961
Xylenes, Total	0.00856		0.00610	0.00830	1.18	05/23/2018 15:55	WG1114961
(S) Toluene-d8	*114*			*80.0-120*		*05/23/2018 15:55*	WG1114961
(S) Toluene-d8	*105*			*80.0-120*		*05/24/2018 14:41*	WG1114961-3
(S) Dibromofluoromethane	*93.1*			*74.0-131*		*05/23/2018 15:55*	WG1114961
(S) Dibromofluoromethane	*91.3*			*74.0-131*		*05/24/2018 14:41*	WG1114961-3
(S) 4-Bromofluorobenzene	*115*			*64.0-132*		*05/23/2018 15:55*	WG1114961

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
(S) 4-Bromofluorobenzene	*107*			*64.0-132*		*05/24/2018 14:41*	WG1114961-3

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.7		1	05/24/2018 11:04	WG1115189

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U	J3 J6 O1	0.747	2.33	1	05/29/2018 15:39	WG1117105

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.61	T8	1	05/23/2018 08:50	WG1114879

Sample Narrative:

L995461-08 WG1114879: 7.61 at 22.2C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.991		0.00327	0.0233	1	05/24/2018 08:23	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.875	2.33	1	05/24/2018 12:27	WG1114824
Arsenic	20.8		0.759	2.33	1	05/24/2018 12:27	WG1114824
Beryllium	0.666		0.0817	0.233	1	05/24/2018 12:27	WG1114824
Cadmium	1.11		0.0817	0.584	1	05/24/2018 12:27	WG1114824
Chromium	15.1		0.163	1.17	1	05/24/2018 12:27	WG1114824
Copper	112		0.619	2.33	1	05/24/2018 12:27	WG1114824
Lead	295		0.222	0.584	1	05/24/2018 12:27	WG1114824
Nickel	9.93		0.572	2.33	1	05/24/2018 12:27	WG1114824
Selenium	1.06	J	0.864	2.33	1	05/24/2018 12:27	WG1114824
Silver	0.778	J	0.327	1.17	1	05/24/2018 12:27	WG1114824
Thallium	U		0.759	2.33	1	05/24/2018 12:27	WG1114824
Zinc	135		0.689	5.84	1	05/24/2018 12:27	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	0.0417	J3	0.0161	0.0295	1.01	05/23/2018 16:16	WG1114961
Acrylonitrile	U		0.00224	0.0147	1.01	05/23/2018 16:16	WG1114961
Benzene	0.0103		0.000471	0.00118	1.01	05/23/2018 16:16	WG1114961
Bromobenzene	U		0.00124	0.0147	1.01	05/23/2018 16:16	WG1114961
Bromodichloromethane	U		0.000929	0.00295	1.01	05/23/2018 16:16	WG1114961
Bromoform	U		0.00705	0.0295	1.01	05/23/2018 16:16	WG1114961
Bromomethane	U		0.00436	0.0147	1.01	05/23/2018 16:16	WG1114961
n-Butylbenzene	U		0.00453	0.0147	1.01	05/23/2018 16:16	WG1114961
sec-Butylbenzene	U		0.00299	0.0147	1.01	05/23/2018 16:16	WG1114961
tert-Butylbenzene	0.00191	J	0.00182	0.00589	1.01	05/23/2018 16:16	WG1114961
Carbon tetrachloride	U		0.00127	0.00589	1.01	05/23/2018 16:16	WG1114961
Chlorobenzene	U		0.000676	0.00295	1.01	05/23/2018 16:16	WG1114961
Chlorodibromomethane	U		0.000530	0.00295	1.01	05/23/2018 16:16	WG1114961
Chloroethane	U		0.00127	0.00589	1.01	05/23/2018 16:16	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	0.00185	J	0.000489	0.00295	1.01	05/23/2018 16:16	WG1114961
Chloromethane	U		0.00163	0.0147	1.01	05/23/2018 16:16	WG1114961
2-Chlorotoluene	U		0.00108	0.00295	1.01	05/23/2018 16:16	WG1114961
4-Chlorotoluene	U	J4	0.00133	0.00589	1.01	05/23/2018 16:16	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00601	0.0295	1.01	05/23/2018 16:16	WG1114961
1,2-Dibromoethane	U		0.000619	0.00295	1.01	05/23/2018 16:16	WG1114961
Dibromomethane	U		0.00118	0.00589	1.01	05/23/2018 16:16	WG1114961
1,2-Dichlorobenzene	U		0.00170	0.00589	1.01	05/23/2018 16:16	WG1114961
1,3-Dichlorobenzene	U		0.00201	0.00589	1.01	05/23/2018 16:16	WG1114961
1,4-Dichlorobenzene	0.00416	J	0.00232	0.00589	1.01	05/23/2018 16:16	WG1114961
Dichlorodifluoromethane	U		0.000964	0.00295	1.01	05/23/2018 16:16	WG1114961
1,1-Dichloroethane	U		0.000678	0.00295	1.01	05/23/2018 16:16	WG1114961
1,2-Dichloroethane	U		0.000560	0.00295	1.01	05/23/2018 16:16	WG1114961
1,1-Dichloroethene	U		0.000589	0.00295	1.01	05/23/2018 16:16	WG1114961
cis-1,2-Dichloroethene	U		0.000813	0.00295	1.01	05/23/2018 16:16	WG1114961
trans-1,2-Dichloroethene	U		0.00168	0.00589	1.01	05/23/2018 16:16	WG1114961
1,2-Dichloropropane	0.0699		0.00149	0.00589	1.01	05/23/2018 16:16	WG1114961
1,1-Dichloropropene	U		0.000825	0.00295	1.01	05/23/2018 16:16	WG1114961
1,3-Dichloropropane	U		0.00207	0.00589	1.01	05/23/2018 16:16	WG1114961
cis-1,3-Dichloropropene	U		0.000799	0.00295	1.01	05/23/2018 16:16	WG1114961
trans-1,3-Dichloropropene	U		0.00180	0.00589	1.01	05/23/2018 16:16	WG1114961
2,2-Dichloropropane	U		0.000935	0.00295	1.01	05/23/2018 16:16	WG1114961
Di-isopropyl ether	U		0.000413	0.00118	1.01	05/23/2018 16:16	WG1114961
Ethylbenzene	0.0135		0.000624	0.00295	1.01	05/23/2018 16:16	WG1114961
Hexachloro-1,3-butadiene	U		0.0149	0.0295	1.01	05/23/2018 16:16	WG1114961
Isopropylbenzene	0.00401		0.00102	0.00295	1.01	05/23/2018 16:16	WG1114961
p-Isopropyltoluene	0.00895		0.00274	0.00589	1.01	05/23/2018 16:16	WG1114961
2-Butanone (MEK)	U		0.0147	0.0295	1.01	05/23/2018 16:16	WG1114961
Methylene Chloride	U		0.00783	0.0295	1.01	05/23/2018 16:16	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0118	0.0295	1.01	05/23/2018 16:16	WG1114961
Methyl tert-butyl ether	U		0.000348	0.00118	1.01	05/23/2018 16:16	WG1114961
Naphthalene	0.0420		0.00368	0.0147	1.01	05/23/2018 16:16	WG1114961
n-Propylbenzene	0.00734		0.00139	0.00589	1.01	05/23/2018 16:16	WG1114961
Styrene	U		0.00322	0.0147	1.01	05/23/2018 16:16	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000589	0.00295	1.01	05/23/2018 16:16	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000460	0.00295	1.01	05/23/2018 16:16	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000796	0.00295	1.01	05/23/2018 16:16	WG1114961
Tetrachloroethene	U		0.000825	0.00295	1.01	05/23/2018 16:16	WG1114961
Toluene	0.0848		0.00147	0.00589	1.01	05/23/2018 16:16	WG1114961
1,2,3-Trichlorobenzene	U		0.000736	0.00295	1.01	05/23/2018 16:16	WG1114961
1,2,4-Trichlorobenzene	U		0.00568	0.0147	1.01	05/23/2018 16:16	WG1114961
1,1,1-Trichloroethane	U		0.000324	0.00295	1.01	05/23/2018 16:16	WG1114961
1,1,2-Trichloroethane	U		0.00104	0.00295	1.01	05/23/2018 16:16	WG1114961
Trichloroethene	1.54		0.000471	0.00118	1.01	05/23/2018 16:16	WG1114961
Trichlorofluoromethane	U		0.000589	0.00295	1.01	05/23/2018 16:16	WG1114961
1,2,3-Trichloropropane	U		0.00601	0.0147	1.01	05/23/2018 16:16	WG1114961
1,2,4-Trimethylbenzene	0.0577		0.00137	0.00589	1.01	05/23/2018 16:16	WG1114961
1,2,3-Trimethylbenzene	0.0262		0.00135	0.00589	1.01	05/23/2018 16:16	WG1114961
1,3,5-Trimethylbenzene	0.0196		0.00127	0.00589	1.01	05/23/2018 16:16	WG1114961
Vinyl chloride	U		0.000805	0.00295	1.01	05/23/2018 16:16	WG1114961
Xylenes, Total	0.212		0.00564	0.00766	1.01	05/23/2018 16:16	WG1114961
(S) Toluene-d8	*120*			*80.0-120*		*05/23/2018 16:16*	WG1114961
(S) Dibromofluoromethane	*92.9*			*74.0-131*		*05/23/2018 16:16*	WG1114961
(S) 4-Bromofluorobenzene	*109*			*64.0-132*		*05/23/2018 16:16*	WG1114961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	92.2		1	05/24/2018 11:04	WG1115189

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.694	2.17	1	05/24/2018 13:50	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.63	T8	1	05/23/2018 08:50	WG1114879

Sample Narrative:

L995461-09 WG1114879: 8.63 at 21.9C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0509		0.00304	0.0217	1	05/24/2018 08:26	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.814	2.17	1	05/24/2018 12:30	WG1114824
Arsenic	3.63		0.705	2.17	1	05/24/2018 12:30	WG1114824
Beryllium	0.351		0.0760	0.217	1	05/24/2018 12:30	WG1114824
Cadmium	0.378	J	0.0760	0.543	1	05/24/2018 12:30	WG1114824
Chromium	20.3		0.152	1.09	1	05/24/2018 12:30	WG1114824
Copper	9.94		0.575	2.17	1	05/24/2018 12:30	WG1114824
Lead	30.6		0.206	0.543	1	05/24/2018 12:30	WG1114824
Nickel	8.44		0.532	2.17	1	05/24/2018 12:30	WG1114824
Selenium	U		0.803	2.17	1	05/24/2018 12:30	WG1114824
Silver	U		0.304	1.09	1	05/24/2018 12:30	WG1114824
Thallium	U		0.705	2.17	1	05/24/2018 12:30	WG1114824
Zinc	41.1		0.640	5.43	1	05/24/2018 12:30	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	0.0230	J J3	0.0149	0.0271	1	05/23/2018 16:36	WG1114961
Acrylonitrile	U		0.00206	0.0136	1	05/23/2018 16:36	WG1114961
Benzene	U		0.000434	0.00109	1	05/23/2018 16:36	WG1114961
Bromobenzene	U		0.00114	0.0136	1	05/23/2018 16:36	WG1114961
Bromodichloromethane	U		0.000855	0.00271	1	05/23/2018 16:36	WG1114961
Bromoform	U		0.00649	0.0271	1	05/23/2018 16:36	WG1114961
Bromomethane	U		0.00401	0.0136	1	05/23/2018 16:36	WG1114961
n-Butylbenzene	U		0.00417	0.0136	1	05/23/2018 16:36	WG1114961
sec-Butylbenzene	U		0.00275	0.0136	1	05/23/2018 16:36	WG1114961
tert-Butylbenzene	U		0.00168	0.00543	1	05/23/2018 16:36	WG1114961
Carbon tetrachloride	U		0.00117	0.00543	1	05/23/2018 16:36	WG1114961
Chlorobenzene	U		0.000622	0.00271	1	05/23/2018 16:36	WG1114961
Chlorodibromomethane	U		0.000488	0.00271	1	05/23/2018 16:36	WG1114961
Chloroethane	U		0.00117	0.00543	1	05/23/2018 16:36	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000450	0.00271	1	05/23/2018 16:36	WG1114961
Chloromethane	U		0.00151	0.0136	1	05/23/2018 16:36	WG1114961
2-Chlorotoluene	U		0.000998	0.00271	1	05/23/2018 16:36	WG1114961
4-Chlorotoluene	U	J4	0.00123	0.00543	1	05/23/2018 16:36	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00553	0.0271	1	05/23/2018 16:36	WG1114961
1,2-Dibromoethane	U		0.000570	0.00271	1	05/23/2018 16:36	WG1114961
Dibromomethane	U		0.00109	0.00543	1	05/23/2018 16:36	WG1114961
1,2-Dichlorobenzene	U		0.00157	0.00543	1	05/23/2018 16:36	WG1114961
1,3-Dichlorobenzene	U		0.00184	0.00543	1	05/23/2018 16:36	WG1114961
1,4-Dichlorobenzene	0.00300	J	0.00214	0.00543	1	05/23/2018 16:36	WG1114961
Dichlorodifluoromethane	U		0.000888	0.00271	1	05/23/2018 16:36	WG1114961
1,1-Dichloroethane	U		0.000624	0.00271	1	05/23/2018 16:36	WG1114961
1,2-Dichloroethane	U		0.000515	0.00271	1	05/23/2018 16:36	WG1114961
1,1-Dichloroethene	U		0.000543	0.00271	1	05/23/2018 16:36	WG1114961
cis-1,2-Dichloroethene	U		0.000749	0.00271	1	05/23/2018 16:36	WG1114961
trans-1,2-Dichloroethene	U		0.00155	0.00543	1	05/23/2018 16:36	WG1114961
1,2-Dichloropropane	U		0.00138	0.00543	1	05/23/2018 16:36	WG1114961
1,1-Dichloropropene	U		0.000760	0.00271	1	05/23/2018 16:36	WG1114961
1,3-Dichloropropane	U		0.00190	0.00543	1	05/23/2018 16:36	WG1114961
cis-1,3-Dichloropropene	U		0.000736	0.00271	1	05/23/2018 16:36	WG1114961
trans-1,3-Dichloropropene	U		0.00166	0.00543	1	05/23/2018 16:36	WG1114961
2,2-Dichloropropane	U		0.000860	0.00271	1	05/23/2018 16:36	WG1114961
Di-isopropyl ether	U		0.000380	0.00109	1	05/23/2018 16:36	WG1114961
Ethylbenzene	U		0.000575	0.00271	1	05/23/2018 16:36	WG1114961
Hexachloro-1,3-butadiene	U		0.0138	0.0271	1	05/23/2018 16:36	WG1114961
Isopropylbenzene	U		0.000936	0.00271	1	05/23/2018 16:36	WG1114961
p-Isopropyltoluene	U		0.00253	0.00543	1	05/23/2018 16:36	WG1114961
2-Butanone (MEK)	U		0.0136	0.0271	1	05/23/2018 16:36	WG1114961
Methylene Chloride	U		0.00720	0.0271	1	05/23/2018 16:36	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0109	0.0271	1	05/23/2018 16:36	WG1114961
Methyl tert-butyl ether	U		0.000320	0.00109	1	05/23/2018 16:36	WG1114961
Naphthalene	U		0.00339	0.0136	1	05/23/2018 16:36	WG1114961
n-Propylbenzene	U		0.00128	0.00543	1	05/23/2018 16:36	WG1114961
Styrene	U		0.00296	0.0136	1	05/23/2018 16:36	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000543	0.00271	1	05/23/2018 16:36	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000423	0.00271	1	05/23/2018 16:36	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000732	0.00271	1	05/23/2018 16:36	WG1114961
Tetrachloroethene	U		0.000760	0.00271	1	05/23/2018 16:36	WG1114961
Toluene	0.00273	J	0.00136	0.00543	1	05/23/2018 16:36	WG1114961
1,2,3-Trichlorobenzene	U		0.000678	0.00271	1	05/23/2018 16:36	WG1114961
1,2,4-Trichlorobenzene	U		0.00523	0.0136	1	05/23/2018 16:36	WG1114961
1,1,1-Trichloroethane	U		0.000298	0.00271	1	05/23/2018 16:36	WG1114961
1,1,2-Trichloroethane	U		0.000958	0.00271	1	05/23/2018 16:36	WG1114961
Trichloroethene	0.0196		0.000434	0.00109	1	05/24/2018 15:01	WG1114961-3
Trichlorofluoromethane	U		0.000543	0.00271	1	05/23/2018 16:36	WG1114961
1,2,3-Trichloropropane	U		0.00553	0.0136	1	05/23/2018 16:36	WG1114961
1,2,4-Trimethylbenzene	0.00159	J	0.00126	0.00543	1	05/23/2018 16:36	WG1114961
1,2,3-Trimethylbenzene	U		0.00125	0.00543	1	05/23/2018 16:36	WG1114961
1,3,5-Trimethylbenzene	U		0.00117	0.00543	1	05/23/2018 16:36	WG1114961
Vinyl chloride	U		0.000741	0.00271	1	05/23/2018 16:36	WG1114961
Xylenes, Total	U		0.00519	0.00705	1	05/23/2018 16:36	WG1114961
(S) Toluene-d8	*110*			*80.0-120*		*05/23/2018 16:36*	WG1114961
(S) Toluene-d8	*105*			*80.0-120*		*05/24/2018 15:01*	WG1114961-3
(S) Dibromofluoromethane	*91.9*			*74.0-131*		*05/23/2018 16:36*	WG1114961
(S) Dibromofluoromethane	*91.6*			*74.0-131*		*05/24/2018 15:01*	WG1114961-3
(S) 4-Bromofluorobenzene	*114*			*64.0-132*		*05/23/2018 16:36*	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
(S) 4-Bromofluorobenzene	*111*			*64.0-132*		*05/24/2018 15:01*	WG1114961-3

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	78.5		1	05/24/2018 11:04	WG1115189

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	0.918	J	0.816	2.55	1	05/24/2018 13:51	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.18	T8	1	05/23/2018 08:50	WG1114879

Sample Narrative:

L995461-10 WG1114879: 8.18 at 22C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0260		0.00357	0.0255	1	05/24/2018 08:28	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.956	2.55	1	05/24/2018 12:34	WG1114824
Arsenic	21.4		0.828	2.55	1	05/24/2018 12:34	WG1114824
Beryllium	1.24		0.0892	0.255	1	05/24/2018 12:34	WG1114824
Cadmium	1.05		0.0892	0.637	1	05/24/2018 12:34	WG1114824
Chromium	28.2		0.178	1.27	1	05/24/2018 12:34	WG1114824
Copper	64.3		0.676	2.55	1	05/24/2018 12:34	WG1114824
Lead	62.8		0.242	0.637	1	05/24/2018 12:34	WG1114824
Nickel	39.4		0.625	2.55	1	05/24/2018 12:34	WG1114824
Selenium	1.87	J	0.943	2.55	1	05/24/2018 12:34	WG1114824
Silver	U		0.357	1.27	1	05/24/2018 12:34	WG1114824
Thallium	U		0.828	2.55	1	05/24/2018 12:34	WG1114824
Zinc	111		0.752	6.37	1	05/24/2018 12:34	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J3	0.0175	0.0319	1	05/23/2018 16:57	WG1114961
Acrylonitrile	U		0.00242	0.0159	1	05/23/2018 16:57	WG1114961
Benzene	U		0.000510	0.00127	1	05/23/2018 16:57	WG1114961
Bromobenzene	U		0.00134	0.0159	1	05/23/2018 16:57	WG1114961
Bromodichloromethane	U		0.00100	0.00319	1	05/23/2018 16:57	WG1114961
Bromoform	U		0.00762	0.0319	1	05/23/2018 16:57	WG1114961
Bromomethane	U		0.00472	0.0159	1	05/23/2018 16:57	WG1114961
n-Butylbenzene	U		0.00489	0.0159	1	05/23/2018 16:57	WG1114961
sec-Butylbenzene	U		0.00322	0.0159	1	05/23/2018 16:57	WG1114961
tert-Butylbenzene	U		0.00198	0.00637	1	05/23/2018 16:57	WG1114961
Carbon tetrachloride	U		0.00138	0.00637	1	05/23/2018 16:57	WG1114961
Chlorobenzene	U		0.000730	0.00319	1	05/23/2018 16:57	WG1114961
Chlorodibromomethane	U		0.000574	0.00319	1	05/23/2018 16:57	WG1114961
Chloroethane	U		0.00138	0.00637	1	05/23/2018 16:57	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000529	0.00319	1	05/23/2018 16:57	WG1114961
Chloromethane	U		0.00177	0.0159	1	05/23/2018 16:57	WG1114961
2-Chlorotoluene	U		0.00117	0.00319	1	05/23/2018 16:57	WG1114961
4-Chlorotoluene	U	J4	0.00144	0.00637	1	05/23/2018 16:57	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00650	0.0319	1	05/23/2018 16:57	WG1114961
1,2-Dibromoethane	U		0.000669	0.00319	1	05/23/2018 16:57	WG1114961
Dibromomethane	U		0.00127	0.00637	1	05/23/2018 16:57	WG1114961
1,2-Dichlorobenzene	U		0.00185	0.00637	1	05/23/2018 16:57	WG1114961
1,3-Dichlorobenzene	U		0.00217	0.00637	1	05/23/2018 16:57	WG1114961
1,4-Dichlorobenzene	0.00381	J	0.00251	0.00637	1	05/23/2018 16:57	WG1114961
Dichlorodifluoromethane	U		0.00104	0.00319	1	05/23/2018 16:57	WG1114961
1,1-Dichloroethane	U		0.000733	0.00319	1	05/23/2018 16:57	WG1114961
1,2-Dichloroethane	U		0.000605	0.00319	1	05/23/2018 16:57	WG1114961
1,1-Dichloroethene	U		0.000637	0.00319	1	05/23/2018 16:57	WG1114961
cis-1,2-Dichloroethene	U		0.000879	0.00319	1	05/23/2018 16:57	WG1114961
trans-1,2-Dichloroethene	U		0.00182	0.00637	1	05/23/2018 16:57	WG1114961
1,2-Dichloropropane	U		0.00162	0.00637	1	05/23/2018 16:57	WG1114961
1,1-Dichloropropene	U		0.000892	0.00319	1	05/23/2018 16:57	WG1114961
1,3-Dichloropropane	U		0.00223	0.00637	1	05/23/2018 16:57	WG1114961
cis-1,3-Dichloropropene	U		0.000864	0.00319	1	05/23/2018 16:57	WG1114961
trans-1,3-Dichloropropene	U		0.00195	0.00637	1	05/23/2018 16:57	WG1114961
2,2-Dichloropropane	U		0.00101	0.00319	1	05/23/2018 16:57	WG1114961
Di-isopropyl ether	U		0.000446	0.00127	1	05/23/2018 16:57	WG1114961
Ethylbenzene	U		0.000676	0.00319	1	05/23/2018 16:57	WG1114961
Hexachloro-1,3-butadiene	U		0.0162	0.0319	1	05/23/2018 16:57	WG1114961
Isopropylbenzene	U		0.00110	0.00319	1	05/23/2018 16:57	WG1114961
p-Isopropyltoluene	U		0.00297	0.00637	1	05/23/2018 16:57	WG1114961
2-Butanone (MEK)	U		0.0159	0.0319	1	05/23/2018 16:57	WG1114961
Methylene Chloride	U		0.00846	0.0319	1	05/23/2018 16:57	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0127	0.0319	1	05/23/2018 16:57	WG1114961
Methyl tert-butyl ether	U		0.000376	0.00127	1	05/23/2018 16:57	WG1114961
Naphthalene	U		0.00398	0.0159	1	05/23/2018 16:57	WG1114961
n-Propylbenzene	U		0.00150	0.00637	1	05/23/2018 16:57	WG1114961
Styrene	U		0.00348	0.0159	1	05/23/2018 16:57	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000637	0.00319	1	05/23/2018 16:57	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000497	0.00319	1	05/23/2018 16:57	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000860	0.00319	1	05/23/2018 16:57	WG1114961
Tetrachloroethene	U		0.000892	0.00319	1	05/23/2018 16:57	WG1114961
Toluene	0.00388	J	0.00159	0.00637	1	05/23/2018 16:57	WG1114961
1,2,3-Trichlorobenzene	U		0.000797	0.00319	1	05/23/2018 16:57	WG1114961
1,2,4-Trichlorobenzene	U		0.00614	0.0159	1	05/23/2018 16:57	WG1114961
1,1,1-Trichloroethane	U		0.000351	0.00319	1	05/23/2018 16:57	WG1114961
1,1,2-Trichloroethane	U		0.00113	0.00319	1	05/23/2018 16:57	WG1114961
Trichloroethene	0.0143		0.000510	0.00127	1	05/24/2018 15:21	WG1114961-3
Trichlorofluoromethane	U		0.000637	0.00319	1	05/23/2018 16:57	WG1114961
1,2,3-Trichloropropane	U		0.00650	0.0159	1	05/23/2018 16:57	WG1114961
1,2,4-Trimethylbenzene	0.00192	J	0.00148	0.00637	1	05/23/2018 16:57	WG1114961
1,2,3-Trimethylbenzene	U		0.00147	0.00637	1	05/23/2018 16:57	WG1114961
1,3,5-Trimethylbenzene	U		0.00138	0.00637	1	05/23/2018 16:57	WG1114961
Vinyl chloride	U		0.000871	0.00319	1	05/23/2018 16:57	WG1114961
Xylenes, Total	U		0.00609	0.00828	1	05/23/2018 16:57	WG1114961
(S) Toluene-d8	*113*			*80.0-120*		*05/23/2018 16:57*	WG1114961
(S) Toluene-d8	*106*			*80.0-120*		*05/24/2018 15:21*	WG1114961-3
(S) Dibromofluoromethane	*90.9*			*74.0-131*		*05/23/2018 16:57*	WG1114961
(S) Dibromofluoromethane	*92.0*			*74.0-131*		*05/24/2018 15:21*	WG1114961-3
(S) 4-Bromofluorobenzene	*118*			*64.0-132*		*05/23/2018 16:57*	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
(S) 4-Bromofluorobenzene	*108*			*64.0-132*		*05/24/2018 15:21*	WG1114961-3

Wet Chemistry by Method 7199

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hexavalent Chromium-Low Level	0.0000572	J J6	0.0000200	0.0000600	1	05/22/2018 15:12	WG1113326

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury,Dissolved	U		0.0000490	0.000200	1	05/24/2018 10:21	WG1115429

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:11	WG1115384
Cadmium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:11	WG1115384
Chromium,Dissolved	U		0.00140	0.0100	1	05/25/2018 13:11	WG1115384
Copper,Dissolved	U		0.00530	0.0100	1	05/25/2018 13:11	WG1115384
Nickel,Dissolved	0.00531	J	0.00490	0.0100	1	05/25/2018 13:11	WG1115384
Selenium,Dissolved	U		0.00740	0.0100	1	05/25/2018 13:11	WG1115384
Silver,Dissolved	U		0.00280	0.00500	1	05/25/2018 13:11	WG1115384
Zinc,Dissolved	0.0225	J	0.00590	0.0500	1	05/25/2018 13:11	WG1115384

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	U		0.000754	0.00200	1	05/25/2018 18:29	WG1115388
Arsenic,Dissolved	0.000613	J	0.000250	0.00200	1	05/25/2018 18:29	WG1115388
Lead,Dissolved	U		0.000240	0.00200	1	05/25/2018 18:29	WG1115388
Thallium,Dissolved	U		0.000190	0.00200	1	05/25/2018 18:29	WG1115388

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	U		0.0100	0.0500	1	05/22/2018 17:31	WG1114510
Acrolein	U		0.00887	0.0500	1	05/22/2018 17:31	WG1114510
Acrylonitrile	U		0.00187	0.0100	1	05/22/2018 17:31	WG1114510
Benzene	U		0.000331	0.00100	1	05/22/2018 17:31	WG1114510
Bromobenzene	U		0.000352	0.00100	1	05/22/2018 17:31	WG1114510
Bromodichloromethane	U		0.000380	0.00100	1	05/22/2018 17:31	WG1114510
Bromoform	U		0.000469	0.00100	1	05/22/2018 17:31	WG1114510
Bromomethane	U		0.000866	0.00500	1	05/22/2018 17:31	WG1114510
n-Butylbenzene	U		0.000361	0.00100	1	05/22/2018 17:31	WG1114510
sec-Butylbenzene	U		0.000365	0.00100	1	05/22/2018 17:31	WG1114510
tert-Butylbenzene	U		0.000399	0.00100	1	05/22/2018 17:31	WG1114510
Carbon tetrachloride	U		0.000379	0.00100	1	05/22/2018 17:31	WG1114510
Chlorobenzene	U		0.000348	0.00100	1	05/22/2018 17:31	WG1114510
Chlorodibromomethane	U		0.000327	0.00100	1	05/22/2018 17:31	WG1114510
Chloroethane	U		0.000453	0.00500	1	05/22/2018 17:31	WG1114510
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	05/22/2018 17:31	WG1114510
Chloroform	U		0.000324	0.00500	1	05/22/2018 17:31	WG1114510
Chloromethane	U		0.000276	0.00250	1	05/22/2018 17:31	WG1114510
2-Chlorotoluene	U		0.000375	0.00100	1	05/22/2018 17:31	WG1114510
4-Chlorotoluene	U		0.000351	0.00100	1	05/22/2018 17:31	WG1114510
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	05/22/2018 17:31	WG1114510
1,2-Dibromoethane	U		0.000381	0.00100	1	05/22/2018 17:31	WG1114510
Dibromomethane	U		0.000346	0.00100	1	05/22/2018 17:31	WG1114510

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dichlorobenzene	U		0.000349	0.00100	1	05/22/2018 17:31	WG1114510
1,3-Dichlorobenzene	U		0.000220	0.00100	1	05/22/2018 17:31	WG1114510
1,4-Dichlorobenzene	U		0.000274	0.00100	1	05/22/2018 17:31	WG1114510
Dichlorodifluoromethane	U		0.000551	0.00500	1	05/22/2018 17:31	WG1114510
1,1-Dichloroethane	U		0.000259	0.00100	1	05/22/2018 17:31	WG1114510
1,2-Dichloroethane	U		0.000361	0.00100	1	05/22/2018 17:31	WG1114510
1,1-Dichloroethene	U		0.000398	0.00100	1	05/22/2018 17:31	WG1114510
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	05/22/2018 17:31	WG1114510
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	05/22/2018 17:31	WG1114510
1,2-Dichloropropane	U		0.000306	0.00100	1	05/22/2018 17:31	WG1114510
1,1-Dichloropropene	U		0.000352	0.00100	1	05/22/2018 17:31	WG1114510
1,3-Dichloropropane	U		0.000366	0.00100	1	05/22/2018 17:31	WG1114510
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	05/22/2018 17:31	WG1114510
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	05/22/2018 17:31	WG1114510
2,2-Dichloropropane	U		0.000321	0.00100	1	05/22/2018 17:31	WG1114510
Di-isopropyl ether	U		0.000320	0.00100	1	05/22/2018 17:31	WG1114510
Ethylbenzene	U		0.000384	0.00100	1	05/22/2018 17:31	WG1114510
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	05/22/2018 17:31	WG1114510
Isopropylbenzene	U		0.000326	0.00100	1	05/22/2018 17:31	WG1114510
p-Isopropyltoluene	U		0.000350	0.00100	1	05/22/2018 17:31	WG1114510
2-Butanone (MEK)	U		0.00393	0.0100	1	05/22/2018 17:31	WG1114510
Methylene Chloride	U		0.00100	0.00500	1	05/22/2018 17:31	WG1114510
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	05/22/2018 17:31	WG1114510
Methyl tert-butyl ether	U		0.000367	0.00100	1	05/22/2018 17:31	WG1114510
Naphthalene	U	J3	0.00100	0.00500	1	05/22/2018 17:31	WG1114510
n-Propylbenzene	U		0.000349	0.00100	1	05/22/2018 17:31	WG1114510
Styrene	U		0.000307	0.00100	1	05/22/2018 17:31	WG1114510
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	05/22/2018 17:31	WG1114510
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	05/22/2018 17:31	WG1114510
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	05/22/2018 17:31	WG1114510
Tetrachloroethene	U		0.000372	0.00100	1	05/22/2018 17:31	WG1114510
Toluene	U		0.000412	0.00100	1	05/22/2018 17:31	WG1114510
1,2,3-Trichlorobenzene	U	J3	0.000230	0.00100	1	05/22/2018 17:31	WG1114510
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	05/22/2018 17:31	WG1114510
1,1,1-Trichloroethane	U		0.000319	0.00100	1	05/22/2018 17:31	WG1114510
1,1,2-Trichloroethane	U		0.000383	0.00100	1	05/22/2018 17:31	WG1114510
Trichloroethene	0.0107		0.000398	0.00100	1	05/22/2018 17:31	WG1114510
Trichlorofluoromethane	U		0.00120	0.00500	1	05/22/2018 17:31	WG1114510
1,2,3-Trichloropropane	U		0.000807	0.00250	1	05/22/2018 17:31	WG1114510
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	05/22/2018 17:31	WG1114510
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	05/22/2018 17:31	WG1114510
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	05/22/2018 17:31	WG1114510
Vinyl chloride	U		0.000259	0.00100	1	05/22/2018 17:31	WG1114510
Xylenes, Total	U		0.00106	0.00300	1	05/22/2018 17:31	WG1114510
(S) Toluene-d8	*103*			*80.0-120*		*05/22/2018 17:31*	WG1114510
(S) Dibromofluoromethane	*90.1*			*76.0-123*		*05/22/2018 17:31*	WG1114510
(S) 4-Bromofluorobenzene	*94.7*			*80.0-120*		*05/22/2018 17:31*	WG1114510

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	84.7		1	05/24/2018 11:04	WG1115189

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.756	2.36	1	05/24/2018 13:53	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.71	T8	1	05/23/2018 08:50	WG1114879

Sample Narrative:

L995461-12 WG1114879: 8.71 at 21.6C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0155	J	0.00331	0.0236	1	05/24/2018 08:30	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.886	2.36	1	05/24/2018 12:37	WG1114824
Arsenic	11.9		0.768	2.36	1	05/24/2018 12:37	WG1114824
Beryllium	0.457		0.0827	0.236	1	05/24/2018 12:37	WG1114824
Cadmium	0.278	J	0.0827	0.590	1	05/24/2018 12:37	WG1114824
Chromium	14.2		0.165	1.18	1	05/24/2018 12:37	WG1114824
Copper	13.9		0.626	2.36	1	05/24/2018 12:37	WG1114824
Lead	11.6		0.224	0.590	1	05/24/2018 12:37	WG1114824
Nickel	11.2		0.579	2.36	1	05/24/2018 12:37	WG1114824
Selenium	U		0.874	2.36	1	05/24/2018 12:37	WG1114824
Silver	U		0.331	1.18	1	05/24/2018 12:37	WG1114824
Thallium	U		0.768	2.36	1	05/24/2018 12:37	WG1114824
Zinc	31.4		0.697	5.90	1	05/24/2018 12:37	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J3	0.0162	0.0295	1	05/23/2018 17:18	WG1114961
Acrylonitrile	U		0.00224	0.0148	1	05/23/2018 17:18	WG1114961
Benzene	U		0.000472	0.00118	1	05/23/2018 17:18	WG1114961
Bromobenzene	U		0.00124	0.0148	1	05/23/2018 17:18	WG1114961
Bromodichloromethane	U		0.000931	0.00295	1	05/23/2018 17:18	WG1114961
Bromoform	U		0.00706	0.0295	1	05/23/2018 17:18	WG1114961
Bromomethane	U		0.00437	0.0148	1	05/23/2018 17:18	WG1114961
n-Butylbenzene	U		0.00453	0.0148	1	05/23/2018 17:18	WG1114961
sec-Butylbenzene	U		0.00299	0.0148	1	05/23/2018 17:18	WG1114961
tert-Butylbenzene	U		0.00183	0.00590	1	05/23/2018 17:18	WG1114961
Carbon tetrachloride	U		0.00128	0.00590	1	05/23/2018 17:18	WG1114961
Chlorobenzene	U		0.000677	0.00295	1	05/23/2018 17:18	WG1114961
Chlorodibromomethane	U		0.000531	0.00295	1	05/23/2018 17:18	WG1114961
Chloroethane	U		0.00128	0.00590	1	05/23/2018 17:18	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000490	0.00295	1	05/23/2018 17:18	WG1114961
Chloromethane	U		0.00164	0.0148	1	05/23/2018 17:18	WG1114961
2-Chlorotoluene	U		0.00109	0.00295	1	05/23/2018 17:18	WG1114961
4-Chlorotoluene	U	J4	0.00133	0.00590	1	05/23/2018 17:18	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00602	0.0295	1	05/23/2018 17:18	WG1114961
1,2-Dibromoethane	U		0.000620	0.00295	1	05/23/2018 17:18	WG1114961
Dibromomethane	U		0.00118	0.00590	1	05/23/2018 17:18	WG1114961
1,2-Dichlorobenzene	U		0.00171	0.00590	1	05/23/2018 17:18	WG1114961
1,3-Dichlorobenzene	U		0.00201	0.00590	1	05/23/2018 17:18	WG1114961
1,4-Dichlorobenzene	U		0.00233	0.00590	1	05/23/2018 17:18	WG1114961
Dichlorodifluoromethane	U		0.000966	0.00295	1	05/23/2018 17:18	WG1114961
1,1-Dichloroethane	U		0.000679	0.00295	1	05/23/2018 17:18	WG1114961
1,2-Dichloroethane	U		0.000561	0.00295	1	05/23/2018 17:18	WG1114961
1,1-Dichloroethene	U		0.000590	0.00295	1	05/23/2018 17:18	WG1114961
cis-1,2-Dichloroethene	U		0.000815	0.00295	1	05/23/2018 17:18	WG1114961
trans-1,2-Dichloroethene	U		0.00169	0.00590	1	05/23/2018 17:18	WG1114961
1,2-Dichloropropane	U		0.00150	0.00590	1	05/23/2018 17:18	WG1114961
1,1-Dichloropropene	U		0.000827	0.00295	1	05/23/2018 17:18	WG1114961
1,3-Dichloropropane	U		0.00207	0.00590	1	05/23/2018 17:18	WG1114961
cis-1,3-Dichloropropene	U		0.000801	0.00295	1	05/23/2018 17:18	WG1114961
trans-1,3-Dichloropropene	U		0.00181	0.00590	1	05/23/2018 17:18	WG1114961
2,2-Dichloropropane	U		0.000936	0.00295	1	05/23/2018 17:18	WG1114961
Di-isopropyl ether	U		0.000413	0.00118	1	05/23/2018 17:18	WG1114961
Ethylbenzene	U		0.000626	0.00295	1	05/23/2018 17:18	WG1114961
Hexachloro-1,3-butadiene	U		0.0150	0.0295	1	05/23/2018 17:18	WG1114961
Isopropylbenzene	U		0.00102	0.00295	1	05/23/2018 17:18	WG1114961
p-Isopropyltoluene	U		0.00275	0.00590	1	05/23/2018 17:18	WG1114961
2-Butanone (MEK)	U		0.0148	0.0295	1	05/23/2018 17:18	WG1114961
Methylene Chloride	U		0.00784	0.0295	1	05/23/2018 17:18	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0118	0.0295	1	05/23/2018 17:18	WG1114961
Methyl tert-butyl ether	U		0.000348	0.00118	1	05/23/2018 17:18	WG1114961
Naphthalene	U		0.00368	0.0148	1	05/23/2018 17:18	WG1114961
n-Propylbenzene	U		0.00139	0.00590	1	05/23/2018 17:18	WG1114961
Styrene	U		0.00322	0.0148	1	05/23/2018 17:18	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000590	0.00295	1	05/23/2018 17:18	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000461	0.00295	1	05/23/2018 17:18	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000797	0.00295	1	05/23/2018 17:18	WG1114961
Tetrachloroethene	U		0.000827	0.00295	1	05/23/2018 17:18	WG1114961
Toluene	0.00444	J	0.00148	0.00590	1	05/23/2018 17:18	WG1114961
1,2,3-Trichlorobenzene	U		0.000738	0.00295	1	05/23/2018 17:18	WG1114961
1,2,4-Trichlorobenzene	U		0.00569	0.0148	1	05/23/2018 17:18	WG1114961
1,1,1-Trichloroethane	U		0.000325	0.00295	1	05/23/2018 17:18	WG1114961
1,1,2-Trichloroethane	U		0.00104	0.00295	1	05/23/2018 17:18	WG1114961
Trichloroethene	0.000714	J	0.000472	0.00118	1	05/24/2018 15:41	WG1114961-3
Trichlorofluoromethane	U		0.000590	0.00295	1	05/23/2018 17:18	WG1114961
1,2,3-Trichloropropane	U		0.00602	0.0148	1	05/23/2018 17:18	WG1114961
1,2,4-Trimethylbenzene	U		0.00137	0.00590	1	05/23/2018 17:18	WG1114961
1,2,3-Trimethylbenzene	U		0.00136	0.00590	1	05/23/2018 17:18	WG1114961
1,3,5-Trimethylbenzene	U		0.00128	0.00590	1	05/23/2018 17:18	WG1114961
Vinyl chloride	U		0.000807	0.00295	1	05/23/2018 17:18	WG1114961
Xylenes, Total	U		0.00564	0.00768	1	05/23/2018 17:18	WG1114961
(S) Toluene-d8	*118*			*80.0-120*		*05/23/2018 17:18*	WG1114961
(S) Toluene-d8	*105*			*80.0-120*		*05/24/2018 15:41*	WG1114961-3
(S) Dibromofluoromethane	*92.3*			*74.0-131*		*05/23/2018 17:18*	WG1114961
(S) Dibromofluoromethane	*89.3*			*74.0-131*		*05/24/2018 15:41*	WG1114961-3
(S) 4-Bromofluorobenzene	*117*			*64.0-132*		*05/23/2018 17:18*	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
(S) 4-Bromofluorobenzene	*109*			*64.0-132*		*05/24/2018 15:41*	WG1114961-3

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	82.4		1	05/24/2018 11:04	WG1115189

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.776	2.43	1	05/24/2018 13:53	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.37	T8	1	05/23/2018 08:50	WG1114879

Sample Narrative:

L995461-13 WG1114879: 8.37 at 22.3C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0122	J	0.00340	0.0243	1	05/24/2018 08:32	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.910	2.43	1	05/24/2018 12:41	WG1114824
Arsenic	9.83		0.788	2.43	1	05/24/2018 12:41	WG1114824
Beryllium	0.524		0.0849	0.243	1	05/24/2018 12:41	WG1114824
Cadmium	0.440	J	0.0849	0.606	1	05/24/2018 12:41	WG1114824
Chromium	15.4		0.170	1.21	1	05/24/2018 12:41	WG1114824
Copper	34.6		0.643	2.43	1	05/24/2018 12:41	WG1114824
Lead	19.2		0.230	0.606	1	05/24/2018 12:41	WG1114824
Nickel	12.9		0.594	2.43	1	05/24/2018 12:41	WG1114824
Selenium	2.53		0.898	2.43	1	05/24/2018 12:41	WG1114824
Silver	U		0.340	1.21	1	05/24/2018 12:41	WG1114824
Thallium	U		0.788	2.43	1	05/24/2018 12:41	WG1114824
Zinc	49.1		0.716	6.06	1	05/24/2018 12:41	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J3	0.0166	0.0303	1	05/23/2018 17:39	WG1114961
Acrylonitrile	U		0.00230	0.0152	1	05/23/2018 17:39	WG1114961
Benzene	U		0.000485	0.00121	1	05/23/2018 17:39	WG1114961
Bromobenzene	U		0.00127	0.0152	1	05/23/2018 17:39	WG1114961
Bromodichloromethane	U		0.000956	0.00303	1	05/23/2018 17:39	WG1114961
Bromoform	U		0.00725	0.0303	1	05/23/2018 17:39	WG1114961
Bromomethane	U		0.00449	0.0152	1	05/23/2018 17:39	WG1114961
n-Butylbenzene	U		0.00466	0.0152	1	05/23/2018 17:39	WG1114961
sec-Butylbenzene	U		0.00307	0.0152	1	05/23/2018 17:39	WG1114961
tert-Butylbenzene	U		0.00188	0.00606	1	05/23/2018 17:39	WG1114961
Carbon tetrachloride	U		0.00131	0.00606	1	05/23/2018 17:39	WG1114961
Chlorobenzene	U		0.000695	0.00303	1	05/23/2018 17:39	WG1114961
Chlorodibromomethane	U		0.000546	0.00303	1	05/23/2018 17:39	WG1114961
Chloroethane	U		0.00131	0.00606	1	05/23/2018 17:39	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000503	0.00303	1	05/23/2018 17:39	WG1114961
Chloromethane	U		0.00169	0.0152	1	05/23/2018 17:39	WG1114961
2-Chlorotoluene	U		0.00112	0.00303	1	05/23/2018 17:39	WG1114961
4-Chlorotoluene	U	J4	0.00137	0.00606	1	05/23/2018 17:39	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00619	0.0303	1	05/23/2018 17:39	WG1114961
1,2-Dibromoethane	U		0.000637	0.00303	1	05/23/2018 17:39	WG1114961
Dibromomethane	U		0.00121	0.00606	1	05/23/2018 17:39	WG1114961
1,2-Dichlorobenzene	U		0.00176	0.00606	1	05/23/2018 17:39	WG1114961
1,3-Dichlorobenzene	U		0.00206	0.00606	1	05/23/2018 17:39	WG1114961
1,4-Dichlorobenzene	0.00286	J	0.00239	0.00606	1	05/23/2018 17:39	WG1114961
Dichlorodifluoromethane	U		0.000992	0.00303	1	05/23/2018 17:39	WG1114961
1,1-Dichloroethane	U		0.000697	0.00303	1	05/23/2018 17:39	WG1114961
1,2-Dichloroethane	U		0.000576	0.00303	1	05/23/2018 17:39	WG1114961
1,1-Dichloroethene	U		0.000606	0.00303	1	05/23/2018 17:39	WG1114961
cis-1,2-Dichloroethene	U		0.000837	0.00303	1	05/23/2018 17:39	WG1114961
trans-1,2-Dichloroethene	U		0.00173	0.00606	1	05/23/2018 17:39	WG1114961
1,2-Dichloropropane	U		0.00154	0.00606	1	05/23/2018 17:39	WG1114961
1,1-Dichloropropene	U		0.000849	0.00303	1	05/23/2018 17:39	WG1114961
1,3-Dichloropropane	U		0.00212	0.00606	1	05/23/2018 17:39	WG1114961
cis-1,3-Dichloropropene	U		0.000822	0.00303	1	05/23/2018 17:39	WG1114961
trans-1,3-Dichloropropene	U		0.00186	0.00606	1	05/23/2018 17:39	WG1114961
2,2-Dichloropropane	U		0.000962	0.00303	1	05/23/2018 17:39	WG1114961
Di-isopropyl ether	U		0.000425	0.00121	1	05/23/2018 17:39	WG1114961
Ethylbenzene	U		0.000643	0.00303	1	05/23/2018 17:39	WG1114961
Hexachloro-1,3-butadiene	U		0.0154	0.0303	1	05/23/2018 17:39	WG1114961
Isopropylbenzene	U		0.00105	0.00303	1	05/23/2018 17:39	WG1114961
p-Isopropyltoluene	U		0.00283	0.00606	1	05/23/2018 17:39	WG1114961
2-Butanone (MEK)	U		0.0152	0.0303	1	05/23/2018 17:39	WG1114961
Methylene Chloride	U		0.00805	0.0303	1	05/23/2018 17:39	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0121	0.0303	1	05/23/2018 17:39	WG1114961
Methyl tert-butyl ether	U		0.000358	0.00121	1	05/23/2018 17:39	WG1114961
Naphthalene	U		0.00378	0.0152	1	05/23/2018 17:39	WG1114961
n-Propylbenzene	U		0.00143	0.00606	1	05/23/2018 17:39	WG1114961
Styrene	U		0.00331	0.0152	1	05/23/2018 17:39	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000606	0.00303	1	05/23/2018 17:39	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000473	0.00303	1	05/23/2018 17:39	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000819	0.00303	1	05/23/2018 17:39	WG1114961
Tetrachloroethene	U		0.000849	0.00303	1	05/23/2018 17:39	WG1114961
Toluene	0.00329	J	0.00152	0.00606	1	05/23/2018 17:39	WG1114961
1,2,3-Trichlorobenzene	U		0.000758	0.00303	1	05/23/2018 17:39	WG1114961
1,2,4-Trichlorobenzene	U		0.00585	0.0152	1	05/23/2018 17:39	WG1114961
1,1,1-Trichloroethane	U		0.000334	0.00303	1	05/23/2018 17:39	WG1114961
1,1,2-Trichloroethane	U		0.00107	0.00303	1	05/23/2018 17:39	WG1114961
Trichloroethene	0.00142		0.000485	0.00121	1	05/24/2018 16:00	WG1114961-3
Trichlorofluoromethane	U		0.000606	0.00303	1	05/23/2018 17:39	WG1114961
1,2,3-Trichloropropane	U		0.00619	0.0152	1	05/23/2018 17:39	WG1114961
1,2,4-Trimethylbenzene	U		0.00141	0.00606	1	05/23/2018 17:39	WG1114961
1,2,3-Trimethylbenzene	U		0.00139	0.00606	1	05/23/2018 17:39	WG1114961
1,3,5-Trimethylbenzene	U		0.00131	0.00606	1	05/23/2018 17:39	WG1114961
Vinyl chloride	U		0.000828	0.00303	1	05/23/2018 17:39	WG1114961
Xylenes, Total	U		0.00580	0.00788	1	05/23/2018 17:39	WG1114961
(S) Toluene-d8	*121*	J1		*80.0-120*		*05/23/2018 17:39*	WG1114961
(S) Toluene-d8	*107*			*80.0-120*		*05/24/2018 16:00*	WG1114961-3
(S) Dibromofluoromethane	*94.7*			*74.0-131*		*05/23/2018 17:39*	WG1114961
(S) Dibromofluoromethane	*91.4*			*74.0-131*		*05/24/2018 16:00*	WG1114961-3
(S) 4-Bromofluorobenzene	*116*			*64.0-132*		*05/23/2018 17:39*	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
(S) 4-Bromofluorobenzene	*110*			*64.0-132*		*05/24/2018 16:00*	WG1114961-3

Wet Chemistry by Method 7199

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hexavalent Chromium-Low Level	0.0000960		0.0000200	0.0000600	1	05/22/2018 15:36	WG1113326

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury,Dissolved	U		0.0000490	0.000200	1	05/24/2018 10:23	WG1115429

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:19	WG1115384
Cadmium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:19	WG1115384
Chromium,Dissolved	0.00164	J	0.00140	0.0100	1	05/25/2018 13:19	WG1115384
Copper,Dissolved	U		0.00530	0.0100	1	05/25/2018 13:19	WG1115384
Nickel,Dissolved	U		0.00490	0.0100	1	05/25/2018 13:19	WG1115384
Selenium,Dissolved	U		0.00740	0.0100	1	05/25/2018 13:19	WG1115384
Silver,Dissolved	U		0.00280	0.00500	1	05/25/2018 13:19	WG1115384
Zinc,Dissolved	0.00948	J	0.00590	0.0500	1	05/25/2018 13:19	WG1115384

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	U		0.000754	0.00200	1	05/25/2018 18:42	WG1115388
Arsenic,Dissolved	0.000283	J	0.000250	0.00200	1	05/25/2018 18:42	WG1115388
Lead,Dissolved	U		0.000240	0.00200	1	05/25/2018 18:42	WG1115388
Thallium,Dissolved	U		0.000190	0.00200	1	05/25/2018 18:42	WG1115388

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	U		0.0100	0.0500	1	05/22/2018 17:51	WG1114510
Acrolein	U		0.00887	0.0500	1	05/22/2018 17:51	WG1114510
Acrylonitrile	U		0.00187	0.0100	1	05/22/2018 17:51	WG1114510
Benzene	U		0.000331	0.00100	1	05/22/2018 17:51	WG1114510
Bromobenzene	U		0.000352	0.00100	1	05/22/2018 17:51	WG1114510
Bromodichloromethane	U		0.000380	0.00100	1	05/22/2018 17:51	WG1114510
Bromoform	U		0.000469	0.00100	1	05/22/2018 17:51	WG1114510
Bromomethane	U		0.000866	0.00500	1	05/22/2018 17:51	WG1114510
n-Butylbenzene	U		0.000361	0.00100	1	05/22/2018 17:51	WG1114510
sec-Butylbenzene	U		0.000365	0.00100	1	05/22/2018 17:51	WG1114510
tert-Butylbenzene	U		0.000399	0.00100	1	05/22/2018 17:51	WG1114510
Carbon tetrachloride	U		0.000379	0.00100	1	05/22/2018 17:51	WG1114510
Chlorobenzene	U		0.000348	0.00100	1	05/22/2018 17:51	WG1114510
Chlorodibromomethane	U		0.000327	0.00100	1	05/22/2018 17:51	WG1114510
Chloroethane	U		0.000453	0.00500	1	05/22/2018 17:51	WG1114510
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	05/22/2018 17:51	WG1114510
Chloroform	U		0.000324	0.00500	1	05/22/2018 17:51	WG1114510
Chloromethane	U		0.000276	0.00250	1	05/22/2018 17:51	WG1114510
2-Chlorotoluene	U		0.000375	0.00100	1	05/22/2018 17:51	WG1114510
4-Chlorotoluene	U		0.000351	0.00100	1	05/22/2018 17:51	WG1114510
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	05/22/2018 17:51	WG1114510
1,2-Dibromoethane	U		0.000381	0.00100	1	05/22/2018 17:51	WG1114510
Dibromomethane	U		0.000346	0.00100	1	05/22/2018 17:51	WG1114510

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dichlorobenzene	U		0.000349	0.00100	1	05/22/2018 17:51	WG1114510
1,3-Dichlorobenzene	U		0.000220	0.00100	1	05/22/2018 17:51	WG1114510
1,4-Dichlorobenzene	U		0.000274	0.00100	1	05/22/2018 17:51	WG1114510
Dichlorodifluoromethane	U		0.000551	0.00500	1	05/22/2018 17:51	WG1114510
1,1-Dichloroethane	U		0.000259	0.00100	1	05/22/2018 17:51	WG1114510
1,2-Dichloroethane	U		0.000361	0.00100	1	05/22/2018 17:51	WG1114510
1,1-Dichloroethene	U		0.000398	0.00100	1	05/22/2018 17:51	WG1114510
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	05/22/2018 17:51	WG1114510
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	05/22/2018 17:51	WG1114510
1,2-Dichloropropane	U		0.000306	0.00100	1	05/22/2018 17:51	WG1114510
1,1-Dichloropropene	U		0.000352	0.00100	1	05/22/2018 17:51	WG1114510
1,3-Dichloropropane	U		0.000366	0.00100	1	05/22/2018 17:51	WG1114510
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	05/22/2018 17:51	WG1114510
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	05/22/2018 17:51	WG1114510
2,2-Dichloropropane	U		0.000321	0.00100	1	05/22/2018 17:51	WG1114510
Di-isopropyl ether	U		0.000320	0.00100	1	05/22/2018 17:51	WG1114510
Ethylbenzene	U		0.000384	0.00100	1	05/22/2018 17:51	WG1114510
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	05/22/2018 17:51	WG1114510
Isopropylbenzene	U		0.000326	0.00100	1	05/22/2018 17:51	WG1114510
p-Isopropyltoluene	U		0.000350	0.00100	1	05/22/2018 17:51	WG1114510
2-Butanone (MEK)	U		0.00393	0.0100	1	05/22/2018 17:51	WG1114510
Methylene Chloride	U		0.00100	0.00500	1	05/22/2018 17:51	WG1114510
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	05/22/2018 17:51	WG1114510
Methyl tert-butyl ether	U		0.000367	0.00100	1	05/22/2018 17:51	WG1114510
Naphthalene	U	J3	0.00100	0.00500	1	05/22/2018 17:51	WG1114510
n-Propylbenzene	U		0.000349	0.00100	1	05/22/2018 17:51	WG1114510
Styrene	U		0.000307	0.00100	1	05/22/2018 17:51	WG1114510
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	05/22/2018 17:51	WG1114510
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	05/22/2018 17:51	WG1114510
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	05/22/2018 17:51	WG1114510
Tetrachloroethene	U		0.000372	0.00100	1	05/22/2018 17:51	WG1114510
Toluene	U		0.000412	0.00100	1	05/22/2018 17:51	WG1114510
1,2,3-Trichlorobenzene	U	J3	0.000230	0.00100	1	05/22/2018 17:51	WG1114510
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	05/22/2018 17:51	WG1114510
1,1,1-Trichloroethane	U		0.000319	0.00100	1	05/22/2018 17:51	WG1114510
1,1,2-Trichloroethane	U		0.000383	0.00100	1	05/22/2018 17:51	WG1114510
Trichloroethene	0.000834	J	0.000398	0.00100	1	05/22/2018 17:51	WG1114510
Trichlorofluoromethane	U		0.00120	0.00500	1	05/22/2018 17:51	WG1114510
1,2,3-Trichloropropane	U		0.000807	0.00250	1	05/22/2018 17:51	WG1114510
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	05/22/2018 17:51	WG1114510
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	05/22/2018 17:51	WG1114510
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	05/22/2018 17:51	WG1114510
Vinyl chloride	U		0.000259	0.00100	1	05/22/2018 17:51	WG1114510
Xylenes, Total	U		0.00106	0.00300	1	05/22/2018 17:51	WG1114510
(S) Toluene-d8	*101*			*80.0-120*		*05/22/2018 17:51*	WG1114510
(S) Dibromofluoromethane	*92.3*			*76.0-123*		*05/22/2018 17:51*	WG1114510
(S) 4-Bromofluorobenzene	*92.5*			*80.0-120*		*05/22/2018 17:51*	WG1114510

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.9		1	05/24/2018 10:18	WG1115191

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	1.50	J	0.728	2.28	1	05/24/2018 13:54	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.01	T8	1	05/23/2018 08:50	WG1114879

Sample Narrative:

L995461-15 WG1114879: 8.01 at 22.1C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.260		0.00319	0.0228	1	05/24/2018 08:34	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.853	2.28	1	05/24/2018 12:45	WG1114824
Arsenic	17.5		0.739	2.28	1	05/24/2018 12:45	WG1114824
Beryllium	0.544		0.0796	0.228	1	05/24/2018 12:45	WG1114824
Cadmium	2.16		0.0796	0.569	1	05/24/2018 12:45	WG1114824
Chromium	17.7		0.159	1.14	1	05/24/2018 12:45	WG1114824
Copper	49.0		0.603	2.28	1	05/24/2018 12:45	WG1114824
Lead	299		0.216	0.569	1	05/24/2018 12:45	WG1114824
Nickel	10.1		0.557	2.28	1	05/24/2018 12:45	WG1114824
Selenium	U		0.842	2.28	1	05/24/2018 12:45	WG1114824
Silver	U		0.319	1.14	1	05/24/2018 12:45	WG1114824
Thallium	U		0.739	2.28	1	05/24/2018 12:45	WG1114824
Zinc	210		0.671	5.69	1	05/24/2018 12:45	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J3	0.0156	0.0284	1	05/23/2018 17:59	WG1114961
Acrylonitrile	U		0.00216	0.0142	1	05/23/2018 17:59	WG1114961
Benzene	U		0.000455	0.00114	1	05/23/2018 17:59	WG1114961
Bromobenzene	U		0.00119	0.0142	1	05/23/2018 17:59	WG1114961
Bromodichloromethane	U		0.000896	0.00284	1	05/23/2018 17:59	WG1114961
Bromoform	U		0.00680	0.0284	1	05/23/2018 17:59	WG1114961
Bromomethane	U		0.00421	0.0142	1	05/23/2018 17:59	WG1114961
n-Butylbenzene	U		0.00437	0.0142	1	05/23/2018 17:59	WG1114961
sec-Butylbenzene	U		0.00288	0.0142	1	05/23/2018 17:59	WG1114961
tert-Butylbenzene	U		0.00176	0.00569	1	05/23/2018 17:59	WG1114961
Carbon tetrachloride	U		0.00123	0.00569	1	05/23/2018 17:59	WG1114961
Chlorobenzene	U		0.000652	0.00284	1	05/23/2018 17:59	WG1114961
Chlorodibromomethane	U		0.000512	0.00284	1	05/23/2018 17:59	WG1114961
Chloroethane	U		0.00123	0.00569	1	05/23/2018 17:59	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000472	0.00284	1	05/23/2018 17:59	WG1114961
Chloromethane	U		0.00158	0.0142	1	05/23/2018 17:59	WG1114961
2-Chlorotoluene	U		0.00105	0.00284	1	05/23/2018 17:59	WG1114961
4-Chlorotoluene	U	J4	0.00129	0.00569	1	05/23/2018 17:59	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00580	0.0284	1	05/23/2018 17:59	WG1114961
1,2-Dibromoethane	U		0.000597	0.00284	1	05/23/2018 17:59	WG1114961
Dibromomethane	U		0.00114	0.00569	1	05/23/2018 17:59	WG1114961
1,2-Dichlorobenzene	U		0.00165	0.00569	1	05/23/2018 17:59	WG1114961
1,3-Dichlorobenzene	U		0.00193	0.00569	1	05/23/2018 17:59	WG1114961
1,4-Dichlorobenzene	0.00278	J	0.00224	0.00569	1	05/23/2018 17:59	WG1114961
Dichlorodifluoromethane	U		0.000931	0.00284	1	05/23/2018 17:59	WG1114961
1,1-Dichloroethane	U		0.000654	0.00284	1	05/23/2018 17:59	WG1114961
1,2-Dichloroethane	U		0.000540	0.00284	1	05/23/2018 17:59	WG1114961
1,1-Dichloroethene	U		0.000569	0.00284	1	05/23/2018 17:59	WG1114961
cis-1,2-Dichloroethene	U		0.000785	0.00284	1	05/23/2018 17:59	WG1114961
trans-1,2-Dichloroethene	U		0.00163	0.00569	1	05/23/2018 17:59	WG1114961
1,2-Dichloropropane	U		0.00144	0.00569	1	05/23/2018 17:59	WG1114961
1,1-Dichloropropene	U		0.000796	0.00284	1	05/23/2018 17:59	WG1114961
1,3-Dichloropropane	U		0.00199	0.00569	1	05/23/2018 17:59	WG1114961
cis-1,3-Dichloropropene	U		0.000771	0.00284	1	05/23/2018 17:59	WG1114961
trans-1,3-Dichloropropene	U		0.00174	0.00569	1	05/23/2018 17:59	WG1114961
2,2-Dichloropropane	U		0.000902	0.00284	1	05/23/2018 17:59	WG1114961
Di-isopropyl ether	U		0.000398	0.00114	1	05/23/2018 17:59	WG1114961
Ethylbenzene	U		0.000603	0.00284	1	05/23/2018 17:59	WG1114961
Hexachloro-1,3-butadiene	U		0.0144	0.0284	1	05/23/2018 17:59	WG1114961
Isopropylbenzene	U		0.000982	0.00284	1	05/23/2018 17:59	WG1114961
p-Isopropyltoluene	U		0.00265	0.00569	1	05/23/2018 17:59	WG1114961
2-Butanone (MEK)	U		0.0142	0.0284	1	05/23/2018 17:59	WG1114961
Methylene Chloride	U		0.00755	0.0284	1	05/23/2018 17:59	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0114	0.0284	1	05/23/2018 17:59	WG1114961
Methyl tert-butyl ether	U		0.000336	0.00114	1	05/23/2018 17:59	WG1114961
Naphthalene	U		0.00355	0.0142	1	05/23/2018 17:59	WG1114961
n-Propylbenzene	U		0.00134	0.00569	1	05/23/2018 17:59	WG1114961
Styrene	U		0.00311	0.0142	1	05/23/2018 17:59	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000569	0.00284	1	05/23/2018 17:59	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000444	0.00284	1	05/23/2018 17:59	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000768	0.00284	1	05/23/2018 17:59	WG1114961
Tetrachloroethene	U		0.000796	0.00284	1	05/23/2018 17:59	WG1114961
Toluene	0.00315	J	0.00142	0.00569	1	05/23/2018 17:59	WG1114961
1,2,3-Trichlorobenzene	U		0.000711	0.00284	1	05/23/2018 17:59	WG1114961
1,2,4-Trichlorobenzene	U		0.00548	0.0142	1	05/23/2018 17:59	WG1114961
1,1,1-Trichloroethane	U		0.000313	0.00284	1	05/23/2018 17:59	WG1114961
1,1,2-Trichloroethane	U		0.00100	0.00284	1	05/23/2018 17:59	WG1114961
Trichloroethene	0.00783		0.000455	0.00114	1	05/23/2018 17:59	WG1114961
Trichlorofluoromethane	U		0.000569	0.00284	1	05/23/2018 17:59	WG1114961
1,2,3-Trichloropropane	U		0.00580	0.0142	1	05/23/2018 17:59	WG1114961
1,2,4-Trimethylbenzene	0.00234	J	0.00132	0.00569	1	05/23/2018 17:59	WG1114961
1,2,3-Trimethylbenzene	U		0.00131	0.00569	1	05/23/2018 17:59	WG1114961
1,3,5-Trimethylbenzene	U		0.00123	0.00569	1	05/23/2018 17:59	WG1114961
Vinyl chloride	U		0.000777	0.00284	1	05/23/2018 17:59	WG1114961
Xylenes, Total	U		0.00544	0.00739	1	05/23/2018 17:59	WG1114961
(S) Toluene-d8	*121*	J1		*80.0-120*		*05/23/2018 17:59*	WG1114961
(S) Dibromofluoromethane	*98.6*			*74.0-131*		*05/23/2018 17:59*	WG1114961
(S) 4-Bromofluorobenzene	*113*			*64.0-132*		*05/23/2018 17:59*	WG1114961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	74.9		1	05/24/2018 10:18	WG1115191

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	0.855	J	0.855	2.67	1	05/24/2018 13:54	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.19	T8	1	05/23/2018 08:50	WG1114879

Sample Narrative:

L995461-16 WG1114879: 8.19 at 21.7C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0163	J	0.00374	0.0267	1	05/24/2018 08:36	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		1.00	2.67	1	05/24/2018 12:48	WG1114824
Arsenic	5.62		0.868	2.67	1	05/24/2018 12:48	WG1114824
Beryllium	1.04		0.0935	0.267	1	05/24/2018 12:48	WG1114824
Cadmium	0.597	J	0.0935	0.668	1	05/24/2018 12:48	WG1114824
Chromium	23.4		0.187	1.34	1	05/24/2018 12:48	WG1114824
Copper	55.5		0.708	2.67	1	05/24/2018 12:48	WG1114824
Lead	29.7		0.254	0.668	1	05/24/2018 12:48	WG1114824
Nickel	21.9		0.654	2.67	1	05/24/2018 12:48	WG1114824
Selenium	U		0.988	2.67	1	05/24/2018 12:48	WG1114824
Silver	U		0.374	1.34	1	05/24/2018 12:48	WG1114824
Thallium	U		0.868	2.67	1	05/24/2018 12:48	WG1114824
Zinc	92.0		0.788	6.68	1	05/24/2018 12:48	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J3	0.0183	0.0334	1	05/23/2018 18:20	WG1114961
Acrylonitrile	U		0.00254	0.0167	1	05/23/2018 18:20	WG1114961
Benzene	U		0.000534	0.00134	1	05/23/2018 18:20	WG1114961
Bromobenzene	U		0.00140	0.0167	1	05/23/2018 18:20	WG1114961
Bromodichloromethane	U		0.00105	0.00334	1	05/23/2018 18:20	WG1114961
Bromoform	U		0.00798	0.0334	1	05/23/2018 18:20	WG1114961
Bromomethane	U		0.00494	0.0167	1	05/23/2018 18:20	WG1114961
n-Butylbenzene	U		0.00513	0.0167	1	05/23/2018 18:20	WG1114961
sec-Butylbenzene	U		0.00338	0.0167	1	05/23/2018 18:20	WG1114961
tert-Butylbenzene	U		0.00207	0.00668	1	05/23/2018 18:20	WG1114961
Carbon tetrachloride	U		0.00144	0.00668	1	05/23/2018 18:20	WG1114961
Chlorobenzene	U		0.000765	0.00334	1	05/23/2018 18:20	WG1114961
Chlorodibromomethane	U		0.000601	0.00334	1	05/23/2018 18:20	WG1114961
Chloroethane	U		0.00144	0.00668	1	05/23/2018 18:20	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000554	0.00334	1	05/23/2018 18:20	WG1114961
Chloromethane	U		0.00186	0.0167	1	05/23/2018 18:20	WG1114961
2-Chlorotoluene	U		0.00123	0.00334	1	05/23/2018 18:20	WG1114961
4-Chlorotoluene	U	J4	0.00151	0.00668	1	05/23/2018 18:20	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00681	0.0334	1	05/23/2018 18:20	WG1114961
1,2-Dibromoethane	U		0.000701	0.00334	1	05/23/2018 18:20	WG1114961
Dibromomethane	U		0.00134	0.00668	1	05/23/2018 18:20	WG1114961
1,2-Dichlorobenzene	U		0.00194	0.00668	1	05/23/2018 18:20	WG1114961
1,3-Dichlorobenzene	U		0.00227	0.00668	1	05/23/2018 18:20	WG1114961
1,4-Dichlorobenzene	0.00281	J	0.00263	0.00668	1	05/23/2018 18:20	WG1114961
Dichlorodifluoromethane	U		0.00109	0.00334	1	05/23/2018 18:20	WG1114961
1,1-Dichloroethane	U		0.000768	0.00334	1	05/23/2018 18:20	WG1114961
1,2-Dichloroethane	U		0.000634	0.00334	1	05/23/2018 18:20	WG1114961
1,1-Dichloroethene	U		0.000668	0.00334	1	05/23/2018 18:20	WG1114961
cis-1,2-Dichloroethene	U		0.000921	0.00334	1	05/23/2018 18:20	WG1114961
trans-1,2-Dichloroethene	U		0.00191	0.00668	1	05/23/2018 18:20	WG1114961
1,2-Dichloropropane	U		0.00170	0.00668	1	05/23/2018 18:20	WG1114961
1,1-Dichloropropene	U		0.000935	0.00334	1	05/23/2018 18:20	WG1114961
1,3-Dichloropropane	U		0.00234	0.00668	1	05/23/2018 18:20	WG1114961
cis-1,3-Dichloropropene	U		0.000905	0.00334	1	05/23/2018 18:20	WG1114961
trans-1,3-Dichloropropene	U		0.00204	0.00668	1	05/23/2018 18:20	WG1114961
2,2-Dichloropropane	U		0.00106	0.00334	1	05/23/2018 18:20	WG1114961
Di-isopropyl ether	U		0.000467	0.00134	1	05/23/2018 18:20	WG1114961
Ethylbenzene	U		0.000708	0.00334	1	05/23/2018 18:20	WG1114961
Hexachloro-1,3-butadiene	U		0.0170	0.0334	1	05/23/2018 18:20	WG1114961
Isopropylbenzene	U		0.00115	0.00334	1	05/23/2018 18:20	WG1114961
p-Isopropyltoluene	U		0.00311	0.00668	1	05/23/2018 18:20	WG1114961
2-Butanone (MEK)	U		0.0167	0.0334	1	05/23/2018 18:20	WG1114961
Methylene Chloride	U		0.00887	0.0334	1	05/23/2018 18:20	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0134	0.0334	1	05/23/2018 18:20	WG1114961
Methyl tert-butyl ether	U		0.000394	0.00134	1	05/23/2018 18:20	WG1114961
Naphthalene	U		0.00417	0.0167	1	05/23/2018 18:20	WG1114961
n-Propylbenzene	U		0.00158	0.00668	1	05/23/2018 18:20	WG1114961
Styrene	U		0.00365	0.0167	1	05/23/2018 18:20	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000668	0.00334	1	05/23/2018 18:20	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000521	0.00334	1	05/23/2018 18:20	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000901	0.00334	1	05/23/2018 18:20	WG1114961
Tetrachloroethene	U		0.000935	0.00334	1	05/23/2018 18:20	WG1114961
Toluene	0.00280	J	0.00167	0.00668	1	05/23/2018 18:20	WG1114961
1,2,3-Trichlorobenzene	U		0.000835	0.00334	1	05/23/2018 18:20	WG1114961
1,2,4-Trichlorobenzene	U		0.00644	0.0167	1	05/23/2018 18:20	WG1114961
1,1,1-Trichloroethane	U		0.000367	0.00334	1	05/23/2018 18:20	WG1114961
1,1,2-Trichloroethane	U		0.00118	0.00334	1	05/23/2018 18:20	WG1114961
Trichloroethene	U		0.000534	0.00134	1	05/23/2018 18:20	WG1114961
Trichlorofluoromethane	U		0.000668	0.00334	1	05/23/2018 18:20	WG1114961
1,2,3-Trichloropropane	U		0.00681	0.0167	1	05/23/2018 18:20	WG1114961
1,2,4-Trimethylbenzene	U		0.00155	0.00668	1	05/23/2018 18:20	WG1114961
1,2,3-Trimethylbenzene	U		0.00154	0.00668	1	05/23/2018 18:20	WG1114961
1,3,5-Trimethylbenzene	U		0.00144	0.00668	1	05/23/2018 18:20	WG1114961
Vinyl chloride	U		0.000912	0.00334	1	05/23/2018 18:20	WG1114961
Xylenes, Total	U		0.00638	0.00868	1	05/23/2018 18:20	WG1114961
(S) Toluene-d8	*114*			*80.0-120*		*05/23/2018 18:20*	WG1114961
(S) Dibromofluoromethane	*96.4*			*74.0-131*		*05/23/2018 18:20*	WG1114961
(S) 4-Bromofluorobenzene	*114*			*64.0-132*		*05/23/2018 18:20*	WG1114961

Wet Chemistry by Method 7199

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hexavalent Chromium-Low Level	0.000116		0.0000200	0.0000600	1	05/22/2018 15:44	WG1113326

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury,Dissolved	U		0.0000490	0.000200	1	05/24/2018 10:26	WG1115429

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:21	WG1115384
Cadmium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:21	WG1115384
Chromium,Dissolved	U		0.00140	0.0100	1	05/25/2018 13:21	WG1115384
Copper,Dissolved	U		0.00530	0.0100	1	05/25/2018 13:21	WG1115384
Nickel,Dissolved	0.00590	J	0.00490	0.0100	1	05/25/2018 13:21	WG1115384
Selenium,Dissolved	U		0.00740	0.0100	1	05/25/2018 13:21	WG1115384
Silver,Dissolved	U		0.00280	0.00500	1	05/25/2018 13:21	WG1115384
Zinc,Dissolved	0.0219	J	0.00590	0.0500	1	05/25/2018 13:21	WG1115384

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	U		0.000754	0.00200	1	05/25/2018 18:46	WG1115388
Arsenic,Dissolved	U		0.000250	0.00200	1	05/25/2018 18:46	WG1115388
Lead,Dissolved	0.000388	J	0.000240	0.00200	1	05/25/2018 18:46	WG1115388
Thallium,Dissolved	U		0.000190	0.00200	1	05/25/2018 18:46	WG1115388

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	U		0.0100	0.0500	1	05/22/2018 18:11	WG1114510
Acrolein	U		0.00887	0.0500	1	05/22/2018 18:11	WG1114510
Acrylonitrile	U		0.00187	0.0100	1	05/22/2018 18:11	WG1114510
Benzene	U		0.000331	0.00100	1	05/22/2018 18:11	WG1114510
Bromobenzene	U		0.000352	0.00100	1	05/22/2018 18:11	WG1114510
Bromodichloromethane	U		0.000380	0.00100	1	05/22/2018 18:11	WG1114510
Bromoform	U		0.000469	0.00100	1	05/22/2018 18:11	WG1114510
Bromomethane	U		0.000866	0.00500	1	05/22/2018 18:11	WG1114510
n-Butylbenzene	U		0.000361	0.00100	1	05/22/2018 18:11	WG1114510
sec-Butylbenzene	U		0.000365	0.00100	1	05/22/2018 18:11	WG1114510
tert-Butylbenzene	U		0.000399	0.00100	1	05/22/2018 18:11	WG1114510
Carbon tetrachloride	U		0.000379	0.00100	1	05/22/2018 18:11	WG1114510
Chlorobenzene	U		0.000348	0.00100	1	05/22/2018 18:11	WG1114510
Chlorodibromomethane	U		0.000327	0.00100	1	05/22/2018 18:11	WG1114510
Chloroethane	U		0.000453	0.00500	1	05/22/2018 18:11	WG1114510
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	05/22/2018 18:11	WG1114510
Chloroform	U		0.000324	0.00500	1	05/22/2018 18:11	WG1114510
Chloromethane	U		0.000276	0.00250	1	05/22/2018 18:11	WG1114510
2-Chlorotoluene	U		0.000375	0.00100	1	05/22/2018 18:11	WG1114510
4-Chlorotoluene	U		0.000351	0.00100	1	05/22/2018 18:11	WG1114510
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	05/22/2018 18:11	WG1114510
1,2-Dibromoethane	U		0.000381	0.00100	1	05/22/2018 18:11	WG1114510
Dibromomethane	U		0.000346	0.00100	1	05/22/2018 18:11	WG1114510

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dichlorobenzene	U		0.000349	0.00100	1	05/22/2018 18:11	WG1114510
1,3-Dichlorobenzene	U		0.000220	0.00100	1	05/22/2018 18:11	WG1114510
1,4-Dichlorobenzene	U		0.000274	0.00100	1	05/22/2018 18:11	WG1114510
Dichlorodifluoromethane	U		0.000551	0.00500	1	05/22/2018 18:11	WG1114510
1,1-Dichloroethane	U		0.000259	0.00100	1	05/22/2018 18:11	WG1114510
1,2-Dichloroethane	U		0.000361	0.00100	1	05/22/2018 18:11	WG1114510
1,1-Dichloroethene	U		0.000398	0.00100	1	05/22/2018 18:11	WG1114510
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	05/22/2018 18:11	WG1114510
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	05/22/2018 18:11	WG1114510
1,2-Dichloropropane	U		0.000306	0.00100	1	05/22/2018 18:11	WG1114510
1,1-Dichloropropene	U		0.000352	0.00100	1	05/22/2018 18:11	WG1114510
1,3-Dichloropropane	U		0.000366	0.00100	1	05/22/2018 18:11	WG1114510
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	05/22/2018 18:11	WG1114510
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	05/22/2018 18:11	WG1114510
2,2-Dichloropropane	U		0.000321	0.00100	1	05/22/2018 18:11	WG1114510
Di-isopropyl ether	U		0.000320	0.00100	1	05/22/2018 18:11	WG1114510
Ethylbenzene	U		0.000384	0.00100	1	05/22/2018 18:11	WG1114510
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	05/22/2018 18:11	WG1114510
Isopropylbenzene	U		0.000326	0.00100	1	05/22/2018 18:11	WG1114510
p-Isopropyltoluene	U		0.000350	0.00100	1	05/22/2018 18:11	WG1114510
2-Butanone (MEK)	U		0.00393	0.0100	1	05/22/2018 18:11	WG1114510
Methylene Chloride	U		0.00100	0.00500	1	05/22/2018 18:11	WG1114510
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	05/22/2018 18:11	WG1114510
Methyl tert-butyl ether	U		0.000367	0.00100	1	05/22/2018 18:11	WG1114510
Naphthalene	U	J3	0.00100	0.00500	1	05/22/2018 18:11	WG1114510
n-Propylbenzene	U		0.000349	0.00100	1	05/22/2018 18:11	WG1114510
Styrene	U		0.000307	0.00100	1	05/22/2018 18:11	WG1114510
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	05/22/2018 18:11	WG1114510
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	05/22/2018 18:11	WG1114510
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	05/22/2018 18:11	WG1114510
Tetrachloroethene	U		0.000372	0.00100	1	05/22/2018 18:11	WG1114510
Toluene	U		0.000412	0.00100	1	05/22/2018 18:11	WG1114510
1,2,3-Trichlorobenzene	U	J3	0.000230	0.00100	1	05/22/2018 18:11	WG1114510
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	05/22/2018 18:11	WG1114510
1,1,1-Trichloroethane	U		0.000319	0.00100	1	05/22/2018 18:11	WG1114510
1,1,2-Trichloroethane	U		0.000383	0.00100	1	05/22/2018 18:11	WG1114510
Trichloroethene	U		0.000398	0.00100	1	05/22/2018 18:11	WG1114510
Trichlorofluoromethane	U		0.00120	0.00500	1	05/22/2018 18:11	WG1114510
1,2,3-Trichloropropane	U		0.000807	0.00250	1	05/22/2018 18:11	WG1114510
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	05/22/2018 18:11	WG1114510
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	05/22/2018 18:11	WG1114510
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	05/22/2018 18:11	WG1114510
Vinyl chloride	U		0.000259	0.00100	1	05/22/2018 18:11	WG1114510
Xylenes, Total	U		0.00106	0.00300	1	05/22/2018 18:11	WG1114510
(S) Toluene-d8	*100*			*80.0-120*		*05/22/2018 18:11*	WG1114510
(S) Dibromofluoromethane	*91.6*			*76.0-123*		*05/22/2018 18:11*	WG1114510
(S) 4-Bromofluorobenzene	*92.8*			*80.0-120*		*05/22/2018 18:11*	WG1114510

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	92.5		1	05/24/2018 10:18	WG1115191

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.692	2.16	1	05/24/2018 13:57	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.48	T8	1	05/23/2018 08:50	WG1114879

Sample Narrative:

L995461-18 WG1114879: 8.48 at 21.9C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.0189	J	0.00303	0.0216	1	05/24/2018 08:39	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.810	2.16	1	05/24/2018 12:52	WG1114824
Arsenic	6.25		0.702	2.16	1	05/24/2018 12:52	WG1114824
Beryllium	0.335		0.0756	0.216	1	05/24/2018 12:52	WG1114824
Cadmium	0.303	J	0.0756	0.540	1	05/24/2018 12:52	WG1114824
Chromium	11.6		0.151	1.08	1	05/24/2018 12:52	WG1114824
Copper	10.3		0.573	2.16	1	05/24/2018 12:52	WG1114824
Lead	12.4		0.205	0.540	1	05/24/2018 12:52	WG1114824
Nickel	8.82		0.529	2.16	1	05/24/2018 12:52	WG1114824
Selenium	1.07	J	0.800	2.16	1	05/24/2018 12:52	WG1114824
Silver	U		0.303	1.08	1	05/24/2018 12:52	WG1114824
Thallium	U		0.702	2.16	1	05/24/2018 12:52	WG1114824
Zinc	33.9		0.638	5.40	1	05/24/2018 12:52	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	0.0177	J J3	0.0148	0.0270	1	05/23/2018 18:40	WG1114961
Acrylonitrile	U		0.00205	0.0135	1	05/23/2018 18:40	WG1114961
Benzene	U		0.000432	0.00108	1	05/23/2018 18:40	WG1114961
Bromobenzene	U		0.00113	0.0135	1	05/23/2018 18:40	WG1114961
Bromodichloromethane	U		0.000851	0.00270	1	05/23/2018 18:40	WG1114961
Bromoform	U		0.00646	0.0270	1	05/23/2018 18:40	WG1114961
Bromomethane	U		0.00400	0.0135	1	05/23/2018 18:40	WG1114961
n-Butylbenzene	U		0.00415	0.0135	1	05/23/2018 18:40	WG1114961
sec-Butylbenzene	U		0.00273	0.0135	1	05/23/2018 18:40	WG1114961
tert-Butylbenzene	U		0.00167	0.00540	1	05/23/2018 18:40	WG1114961
Carbon tetrachloride	U		0.00117	0.00540	1	05/23/2018 18:40	WG1114961
Chlorobenzene	U		0.000619	0.00270	1	05/23/2018 18:40	WG1114961
Chlorodibromomethane	U		0.000486	0.00270	1	05/23/2018 18:40	WG1114961
Chloroethane	U		0.00117	0.00540	1	05/23/2018 18:40	WG1114961

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000448	0.00270	1	05/23/2018 18:40	WG1114961
Chloromethane	U		0.00150	0.0135	1	05/23/2018 18:40	WG1114961
2-Chlorotoluene	U		0.000994	0.00270	1	05/23/2018 18:40	WG1114961
4-Chlorotoluene	U	J4	0.00122	0.00540	1	05/23/2018 18:40	WG1114961
1,2-Dibromo-3-Chloropropane	U		0.00551	0.0270	1	05/23/2018 18:40	WG1114961
1,2-Dibromoethane	U		0.000567	0.00270	1	05/23/2018 18:40	WG1114961
Dibromomethane	U		0.00108	0.00540	1	05/23/2018 18:40	WG1114961
1,2-Dichlorobenzene	U		0.00157	0.00540	1	05/23/2018 18:40	WG1114961
1,3-Dichlorobenzene	U		0.00184	0.00540	1	05/23/2018 18:40	WG1114961
1,4-Dichlorobenzene	0.00421	J	0.00213	0.00540	1	05/23/2018 18:40	WG1114961
Dichlorodifluoromethane	U		0.000884	0.00270	1	05/23/2018 18:40	WG1114961
1,1-Dichloroethane	U		0.000621	0.00270	1	05/23/2018 18:40	WG1114961
1,2-Dichloroethane	U		0.000513	0.00270	1	05/23/2018 18:40	WG1114961
1,1-Dichloroethene	U		0.000540	0.00270	1	05/23/2018 18:40	WG1114961
cis-1,2-Dichloroethene	U		0.000746	0.00270	1	05/23/2018 18:40	WG1114961
trans-1,2-Dichloroethene	U		0.00155	0.00540	1	05/23/2018 18:40	WG1114961
1,2-Dichloropropane	U		0.00137	0.00540	1	05/23/2018 18:40	WG1114961
1,1-Dichloropropene	U		0.000756	0.00270	1	05/23/2018 18:40	WG1114961
1,3-Dichloropropane	U		0.00189	0.00540	1	05/23/2018 18:40	WG1114961
cis-1,3-Dichloropropene	U		0.000733	0.00270	1	05/23/2018 18:40	WG1114961
trans-1,3-Dichloropropene	U		0.00165	0.00540	1	05/23/2018 18:40	WG1114961
2,2-Dichloropropane	U		0.000857	0.00270	1	05/23/2018 18:40	WG1114961
Di-isopropyl ether	U		0.000378	0.00108	1	05/23/2018 18:40	WG1114961
Ethylbenzene	U		0.000573	0.00270	1	05/23/2018 18:40	WG1114961
Hexachloro-1,3-butadiene	U		0.0137	0.0270	1	05/23/2018 18:40	WG1114961
Isopropylbenzene	U		0.000932	0.00270	1	05/23/2018 18:40	WG1114961
p-Isopropyltoluene	U		0.00252	0.00540	1	05/23/2018 18:40	WG1114961
2-Butanone (MEK)	U		0.0135	0.0270	1	05/23/2018 18:40	WG1114961
Methylene Chloride	U		0.00717	0.0270	1	05/23/2018 18:40	WG1114961
4-Methyl-2-pentanone (MIBK)	U		0.0108	0.0270	1	05/23/2018 18:40	WG1114961
Methyl tert-butyl ether	U		0.000319	0.00108	1	05/23/2018 18:40	WG1114961
Naphthalene	U		0.00337	0.0135	1	05/23/2018 18:40	WG1114961
n-Propylbenzene	U		0.00128	0.00540	1	05/23/2018 18:40	WG1114961
Styrene	U		0.00295	0.0135	1	05/23/2018 18:40	WG1114961
1,1,1,2-Tetrachloroethane	U		0.000540	0.00270	1	05/23/2018 18:40	WG1114961
1,1,2,2-Tetrachloroethane	U		0.000421	0.00270	1	05/23/2018 18:40	WG1114961
1,1,2-Trichlorotrifluoroethane	U		0.000729	0.00270	1	05/23/2018 18:40	WG1114961
Tetrachloroethene	U		0.000756	0.00270	1	05/23/2018 18:40	WG1114961
Toluene	0.00325	J	0.00135	0.00540	1	05/23/2018 18:40	WG1114961
1,2,3-Trichlorobenzene	U		0.000675	0.00270	1	05/23/2018 18:40	WG1114961
1,2,4-Trichlorobenzene	U		0.00521	0.0135	1	05/23/2018 18:40	WG1114961
1,1,1-Trichloroethane	U		0.000297	0.00270	1	05/23/2018 18:40	WG1114961
1,1,2-Trichloroethane	U		0.000954	0.00270	1	05/23/2018 18:40	WG1114961
Trichloroethene	0.0135		0.000432	0.00108	1	05/23/2018 18:40	WG1114961
Trichlorofluoromethane	U		0.000540	0.00270	1	05/23/2018 18:40	WG1114961
1,2,3-Trichloropropane	U		0.00551	0.0135	1	05/23/2018 18:40	WG1114961
1,2,4-Trimethylbenzene	0.00196	J	0.00125	0.00540	1	05/23/2018 18:40	WG1114961
1,2,3-Trimethylbenzene	U		0.00124	0.00540	1	05/23/2018 18:40	WG1114961
1,3,5-Trimethylbenzene	U		0.00117	0.00540	1	05/23/2018 18:40	WG1114961
Vinyl chloride	U		0.000738	0.00270	1	05/23/2018 18:40	WG1114961
Xylenes, Total	U		0.00516	0.00702	1	05/23/2018 18:40	WG1114961
(S) Toluene-d8	*114*			*80.0-120*		*05/23/2018 18:40*	WG1114961
(S) Dibromofluoromethane	*95.1*			*74.0-131*		*05/23/2018 18:40*	WG1114961
(S) 4-Bromofluorobenzene	*114*			*64.0-132*		*05/23/2018 18:40*	WG1114961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.7		1	05/24/2018 10:18	WG1115191

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.747	2.33	1	05/24/2018 13:58	WG1114983

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	8.31	T8	1	05/23/2018 08:50	WG1114879

Sample Narrative:

L995461-19 WG1114879: 8.31 at 21.9C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.00652	J	0.00327	0.0233	1	05/24/2018 08:50	WG1114852

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	U		0.875	2.33	1	05/24/2018 13:12	WG1114824
Arsenic	1.60	J	0.758	2.33	1	05/24/2018 13:12	WG1114824
Beryllium	0.135	J	0.0817	0.233	1	05/24/2018 13:12	WG1114824
Cadmium	0.294	J	0.0817	0.583	1	05/24/2018 13:12	WG1114824
Chromium	6.72		0.163	1.17	1	05/24/2018 13:12	WG1114824
Copper	10.8		0.618	2.33	1	05/24/2018 13:12	WG1114824
Lead	7.31		0.222	0.583	1	05/24/2018 13:12	WG1114824
Nickel	5.03		0.572	2.33	1	05/24/2018 13:12	WG1114824
Selenium	0.944	J	0.863	2.33	1	05/24/2018 13:12	WG1114824
Silver	U		0.327	1.17	1	05/24/2018 13:12	WG1114824
Thallium	U		0.758	2.33	1	05/24/2018 13:12	WG1114824
Zinc	18.5		0.688	5.83	1	05/24/2018 13:12	WG1114824

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	0.0211	J	0.0160	0.0292	1	05/26/2018 14:38	WG1116592
Acrylonitrile	U		0.00222	0.0146	1	05/26/2018 14:38	WG1116592
Benzene	U		0.000467	0.00117	1	05/26/2018 14:38	WG1116592
Bromobenzene	U		0.00123	0.0146	1	05/26/2018 14:38	WG1116592
Bromodichloromethane	U		0.000919	0.00292	1	05/26/2018 14:38	WG1116592
Bromoform	U		0.00698	0.0292	1	05/26/2018 14:38	WG1116592
Bromomethane	U		0.00432	0.0146	1	05/26/2018 14:38	WG1116592
n-Butylbenzene	U		0.00448	0.0146	1	05/26/2018 14:38	WG1116592
sec-Butylbenzene	U		0.00295	0.0146	1	05/26/2018 14:38	WG1116592
tert-Butylbenzene	U		0.00181	0.00583	1	05/26/2018 14:38	WG1116592
Carbon tetrachloride	U		0.00126	0.00583	1	05/26/2018 14:38	WG1116592
Chlorobenzene	U		0.000669	0.00292	1	05/26/2018 14:38	WG1116592
Chlorodibromomethane	U		0.000525	0.00292	1	05/26/2018 14:38	WG1116592
Chloroethane	U		0.00126	0.00583	1	05/26/2018 14:38	WG1116592

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000484	0.00292	1	05/26/2018 14:38	WG1116592
Chloromethane	U		0.00162	0.0146	1	05/26/2018 14:38	WG1116592
2-Chlorotoluene	U		0.00107	0.00292	1	05/26/2018 14:38	WG1116592
4-Chlorotoluene	U		0.00132	0.00583	1	05/26/2018 14:38	WG1116592
1,2-Dibromo-3-Chloropropane	U		0.00595	0.0292	1	05/26/2018 14:38	WG1116592
1,2-Dibromoethane	U		0.000613	0.00292	1	05/26/2018 14:38	WG1116592
Dibromomethane	U		0.00117	0.00583	1	05/26/2018 14:38	WG1116592
1,2-Dichlorobenzene	U		0.00169	0.00583	1	05/26/2018 14:38	WG1116592
1,3-Dichlorobenzene	U		0.00198	0.00583	1	05/26/2018 14:38	WG1116592
1,4-Dichlorobenzene	0.00442	J	0.00230	0.00583	1	05/26/2018 14:38	WG1116592
Dichlorodifluoromethane	U		0.000954	0.00292	1	05/26/2018 14:38	WG1116592
1,1-Dichloroethane	U		0.000671	0.00292	1	05/26/2018 14:38	WG1116592
1,2-Dichloroethane	U	J4	0.000554	0.00292	1	05/26/2018 14:38	WG1116592
1,1-Dichloroethene	U		0.000583	0.00292	1	05/26/2018 14:38	WG1116592
cis-1,2-Dichloroethene	U		0.000805	0.00292	1	05/26/2018 14:38	WG1116592
trans-1,2-Dichloroethene	U		0.00167	0.00583	1	05/26/2018 14:38	WG1116592
1,2-Dichloropropane	U		0.00148	0.00583	1	05/26/2018 14:38	WG1116592
1,1-Dichloropropene	U		0.000817	0.00292	1	05/26/2018 14:38	WG1116592
1,3-Dichloropropane	U		0.00204	0.00583	1	05/26/2018 14:38	WG1116592
cis-1,3-Dichloropropene	U		0.000791	0.00292	1	05/26/2018 14:38	WG1116592
trans-1,3-Dichloropropene	U		0.00179	0.00583	1	05/26/2018 14:38	WG1116592
2,2-Dichloropropane	U		0.000925	0.00292	1	05/26/2018 14:38	WG1116592
Di-isopropyl ether	U		0.000408	0.00117	1	05/26/2018 14:38	WG1116592
Ethylbenzene	U		0.000618	0.00292	1	05/26/2018 14:38	WG1116592
Hexachloro-1,3-butadiene	U		0.0148	0.0292	1	05/26/2018 14:38	WG1116592
Isopropylbenzene	U		0.00101	0.00292	1	05/26/2018 14:38	WG1116592
p-Isopropyltoluene	U		0.00272	0.00583	1	05/26/2018 14:38	WG1116592
2-Butanone (MEK)	U		0.0146	0.0292	1	05/26/2018 14:38	WG1116592
Methylene Chloride	U		0.00775	0.0292	1	05/26/2018 14:38	WG1116592
4-Methyl-2-pentanone (MIBK)	U		0.0117	0.0292	1	05/26/2018 14:38	WG1116592
Methyl tert-butyl ether	U		0.000344	0.00117	1	05/26/2018 14:38	WG1116592
Naphthalene	U		0.00364	0.0146	1	05/26/2018 14:38	WG1116592
n-Propylbenzene	U		0.00138	0.00583	1	05/26/2018 14:38	WG1116592
Styrene	U		0.00319	0.0146	1	05/26/2018 14:38	WG1116592
1,1,1,2-Tetrachloroethane	U		0.000583	0.00292	1	05/26/2018 14:38	WG1116592
1,1,2,2-Tetrachloroethane	U		0.000455	0.00292	1	05/26/2018 14:38	WG1116592
1,1,2-Trichlorotrifluoroethane	U		0.000788	0.00292	1	05/26/2018 14:38	WG1116592
Tetrachloroethene	U		0.000817	0.00292	1	05/26/2018 14:38	WG1116592
Toluene	U		0.00146	0.00583	1	05/26/2018 14:38	WG1116592
1,2,3-Trichlorobenzene	U		0.000729	0.00292	1	05/26/2018 14:38	WG1116592
1,2,4-Trichlorobenzene	U		0.00562	0.0146	1	05/26/2018 14:38	WG1116592
1,1,1-Trichloroethane	U		0.000321	0.00292	1	05/26/2018 14:38	WG1116592
1,1,2-Trichloroethane	U		0.00103	0.00292	1	05/26/2018 14:38	WG1116592
Trichloroethene	U		0.000467	0.00117	1	05/26/2018 14:38	WG1116592
Trichlorofluoromethane	U		0.000583	0.00292	1	05/26/2018 14:38	WG1116592
1,2,3-Trichloropropane	U		0.00595	0.0146	1	05/26/2018 14:38	WG1116592
1,2,4-Trimethylbenzene	U		0.00135	0.00583	1	05/26/2018 14:38	WG1116592
1,2,3-Trimethylbenzene	U		0.00134	0.00583	1	05/26/2018 14:38	WG1116592
1,3,5-Trimethylbenzene	U		0.00126	0.00583	1	05/26/2018 14:38	WG1116592
Vinyl chloride	U		0.000797	0.00292	1	05/26/2018 14:38	WG1116592
Xylenes, Total	U		0.00558	0.00758	1	05/26/2018 14:38	WG1116592
(S) Toluene-d8	*117*			*80.0-120*		*05/26/2018 14:38*	WG1116592
(S) Dibromofluoromethane	*88.2*			*74.0-131*		*05/26/2018 14:38*	WG1116592
(S) 4-Bromofluorobenzene	*112*			*64.0-132*		*05/26/2018 14:38*	WG1116592

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Hexavalent Chromium-Low Level	U		0.0000200	0.0000600	1	05/22/2018 15:52	WG1113326

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury,Dissolved	U		0.0000490	0.000200	1	05/24/2018 10:33	WG1115429

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Beryllium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:24	WG1115384
Cadmium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:24	WG1115384
Chromium,Dissolved	U		0.00140	0.0100	1	05/25/2018 13:24	WG1115384
Copper,Dissolved	U		0.00530	0.0100	1	05/25/2018 13:24	WG1115384
Nickel,Dissolved	U		0.00490	0.0100	1	05/25/2018 13:24	WG1115384
Selenium,Dissolved	U		0.00740	0.0100	1	05/25/2018 13:24	WG1115384
Silver,Dissolved	U		0.00280	0.00500	1	05/25/2018 13:24	WG1115384
Zinc,Dissolved	0.0167	J	0.00590	0.0500	1	05/25/2018 13:24	WG1115384

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Antimony,Dissolved	U		0.000754	0.00200	1	05/25/2018 18:51	WG1115388
Arsenic,Dissolved	0.00376		0.000250	0.00200	1	05/25/2018 18:51	WG1115388
Lead,Dissolved	U		0.000240	0.00200	1	05/25/2018 18:51	WG1115388
Thallium,Dissolved	U		0.000190	0.00200	1	05/25/2018 18:51	WG1115388

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	U		0.0100	0.0500	1	05/22/2018 18:31	WG1114510
Acrolein	U		0.00887	0.0500	1	05/22/2018 18:31	WG1114510
Acrylonitrile	U		0.00187	0.0100	1	05/22/2018 18:31	WG1114510
Benzene	U		0.000331	0.00100	1	05/22/2018 18:31	WG1114510
Bromobenzene	U		0.000352	0.00100	1	05/22/2018 18:31	WG1114510
Bromodichloromethane	U		0.000380	0.00100	1	05/22/2018 18:31	WG1114510
Bromoform	U		0.000469	0.00100	1	05/22/2018 18:31	WG1114510
Bromomethane	U		0.000866	0.00500	1	05/22/2018 18:31	WG1114510
n-Butylbenzene	U		0.000361	0.00100	1	05/22/2018 18:31	WG1114510
sec-Butylbenzene	U		0.000365	0.00100	1	05/22/2018 18:31	WG1114510
tert-Butylbenzene	U		0.000399	0.00100	1	05/22/2018 18:31	WG1114510
Carbon tetrachloride	U		0.000379	0.00100	1	05/22/2018 18:31	WG1114510
Chlorobenzene	U		0.000348	0.00100	1	05/22/2018 18:31	WG1114510
Chlorodibromomethane	U		0.000327	0.00100	1	05/22/2018 18:31	WG1114510
Chloroethane	U		0.000453	0.00500	1	05/22/2018 18:31	WG1114510
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	05/22/2018 18:31	WG1114510
Chloroform	U		0.000324	0.00500	1	05/22/2018 18:31	WG1114510
Chloromethane	U		0.000276	0.00250	1	05/22/2018 18:31	WG1114510
2-Chlorotoluene	U		0.000375	0.00100	1	05/22/2018 18:31	WG1114510
4-Chlorotoluene	U		0.000351	0.00100	1	05/22/2018 18:31	WG1114510
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	05/22/2018 18:31	WG1114510
1,2-Dibromoethane	U		0.000381	0.00100	1	05/22/2018 18:31	WG1114510
Dibromomethane	U		0.000346	0.00100	1	05/22/2018 18:31	WG1114510

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dichlorobenzene	U		0.000349	0.00100	1	05/22/2018 18:31	WG1114510
1,3-Dichlorobenzene	U		0.000220	0.00100	1	05/22/2018 18:31	WG1114510
1,4-Dichlorobenzene	U		0.000274	0.00100	1	05/22/2018 18:31	WG1114510
Dichlorodifluoromethane	U		0.000551	0.00500	1	05/22/2018 18:31	WG1114510
1,1-Dichloroethane	U		0.000259	0.00100	1	05/22/2018 18:31	WG1114510
1,2-Dichloroethane	U		0.000361	0.00100	1	05/22/2018 18:31	WG1114510
1,1-Dichloroethene	U		0.000398	0.00100	1	05/22/2018 18:31	WG1114510
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	05/22/2018 18:31	WG1114510
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	05/22/2018 18:31	WG1114510
1,2-Dichloropropane	U		0.000306	0.00100	1	05/22/2018 18:31	WG1114510
1,1-Dichloropropene	U		0.000352	0.00100	1	05/22/2018 18:31	WG1114510
1,3-Dichloropropane	U		0.000366	0.00100	1	05/22/2018 18:31	WG1114510
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	05/22/2018 18:31	WG1114510
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	05/22/2018 18:31	WG1114510
2,2-Dichloropropane	U		0.000321	0.00100	1	05/22/2018 18:31	WG1114510
Di-isopropyl ether	U		0.000320	0.00100	1	05/22/2018 18:31	WG1114510
Ethylbenzene	U		0.000384	0.00100	1	05/22/2018 18:31	WG1114510
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	05/22/2018 18:31	WG1114510
Isopropylbenzene	U		0.000326	0.00100	1	05/22/2018 18:31	WG1114510
p-Isopropyltoluene	U		0.000350	0.00100	1	05/22/2018 18:31	WG1114510
2-Butanone (MEK)	U		0.00393	0.0100	1	05/22/2018 18:31	WG1114510
Methylene Chloride	U		0.00100	0.00500	1	05/22/2018 18:31	WG1114510
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	05/22/2018 18:31	WG1114510
Methyl tert-butyl ether	U		0.000367	0.00100	1	05/22/2018 18:31	WG1114510
Naphthalene	U	J3	0.00100	0.00500	1	05/22/2018 18:31	WG1114510
n-Propylbenzene	U		0.000349	0.00100	1	05/22/2018 18:31	WG1114510
Styrene	U		0.000307	0.00100	1	05/22/2018 18:31	WG1114510
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	05/22/2018 18:31	WG1114510
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	05/22/2018 18:31	WG1114510
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	05/22/2018 18:31	WG1114510
Tetrachloroethene	U		0.000372	0.00100	1	05/22/2018 18:31	WG1114510
Toluene	U		0.000412	0.00100	1	05/22/2018 18:31	WG1114510
1,2,3-Trichlorobenzene	U	J3	0.000230	0.00100	1	05/22/2018 18:31	WG1114510
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	05/22/2018 18:31	WG1114510
1,1,1-Trichloroethane	U		0.000319	0.00100	1	05/22/2018 18:31	WG1114510
1,1,2-Trichloroethane	U		0.000383	0.00100	1	05/22/2018 18:31	WG1114510
Trichloroethene	0.00251		0.000398	0.00100	1	05/22/2018 18:31	WG1114510
Trichlorofluoromethane	U		0.00120	0.00500	1	05/22/2018 18:31	WG1114510
1,2,3-Trichloropropane	U		0.000807	0.00250	1	05/22/2018 18:31	WG1114510
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	05/22/2018 18:31	WG1114510
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	05/22/2018 18:31	WG1114510
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	05/22/2018 18:31	WG1114510
Vinyl chloride	U		0.000259	0.00100	1	05/22/2018 18:31	WG1114510
Xylenes, Total	U		0.00106	0.00300	1	05/22/2018 18:31	WG1114510
(S) Toluene-d8	*98.4*			*80.0-120*		*05/22/2018 18:31*	WG1114510
(S) Dibromofluoromethane	*92.8*			*76.0-123*		*05/22/2018 18:31*	WG1114510
(S) 4-Bromofluorobenzene	*92.7*			*80.0-120*		*05/22/2018 18:31*	WG1114510

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	91.2		1	05/24/2018 10:18	WG1115191

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.702	2.19	1	05/24/2018 13:58	WG1114983

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	86.3		1	05/24/2018 10:18	WG1115191

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	1.16	J	0.742	2.32	1	05/23/2018 15:19	WG1114929

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	90.0		1	05/24/2018 10:18	WG1115191

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	0.844	J	0.711	2.22	1	05/23/2018 15:22	WG1114929

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	82.1		1	05/24/2018 10:18	WG1115191

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	U		0.779	2.43	1	05/23/2018 15:25	WG1114929

Wet Chemistry by Method 7199

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hexavalent Chromium-Low Level	0.0000234	J	0.0000200	0.0000600	1	05/22/2018 16:44	WG1113326

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury,Dissolved	U		0.0000490	0.000200	1	05/24/2018 10:36	WG1115429

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:26	WG1115384
Cadmium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:26	WG1115384
Chromium,Dissolved	U		0.00140	0.0100	1	05/25/2018 13:26	WG1115384
Copper,Dissolved	U		0.00530	0.0100	1	05/25/2018 13:26	WG1115384
Nickel,Dissolved	0.00707	J	0.00490	0.0100	1	05/25/2018 13:26	WG1115384
Selenium,Dissolved	U		0.00740	0.0100	1	05/25/2018 13:26	WG1115384
Silver,Dissolved	U		0.00280	0.00500	1	05/25/2018 13:26	WG1115384
Zinc,Dissolved	0.0203	J	0.00590	0.0500	1	05/25/2018 13:26	WG1115384

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	U		0.000754	0.00200	1	05/25/2018 18:55	WG1115388
Arsenic,Dissolved	0.00114	J	0.000250	0.00200	1	05/25/2018 18:55	WG1115388
Lead,Dissolved	0.000256	J	0.000240	0.00200	1	05/25/2018 18:55	WG1115388
Thallium,Dissolved	U		0.000190	0.00200	1	05/25/2018 18:55	WG1115388

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	U		0.0100	0.0500	1	05/22/2018 18:51	WG1114510
Acrolein	U		0.00887	0.0500	1	05/22/2018 18:51	WG1114510
Acrylonitrile	U		0.00187	0.0100	1	05/22/2018 18:51	WG1114510
Benzene	U		0.000331	0.00100	1	05/22/2018 18:51	WG1114510
Bromobenzene	U		0.000352	0.00100	1	05/22/2018 18:51	WG1114510
Bromodichloromethane	U		0.000380	0.00100	1	05/22/2018 18:51	WG1114510
Bromoform	U		0.000469	0.00100	1	05/22/2018 18:51	WG1114510
Bromomethane	U		0.000866	0.00500	1	05/22/2018 18:51	WG1114510
n-Butylbenzene	U		0.000361	0.00100	1	05/22/2018 18:51	WG1114510
sec-Butylbenzene	U		0.000365	0.00100	1	05/22/2018 18:51	WG1114510
tert-Butylbenzene	U		0.000399	0.00100	1	05/22/2018 18:51	WG1114510
Carbon tetrachloride	U		0.000379	0.00100	1	05/22/2018 18:51	WG1114510
Chlorobenzene	U		0.000348	0.00100	1	05/22/2018 18:51	WG1114510
Chlorodibromomethane	U		0.000327	0.00100	1	05/22/2018 18:51	WG1114510
Chloroethane	U		0.000453	0.00500	1	05/22/2018 18:51	WG1114510
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	05/22/2018 18:51	WG1114510
Chloroform	U		0.000324	0.00500	1	05/22/2018 18:51	WG1114510
Chloromethane	U		0.000276	0.00250	1	05/22/2018 18:51	WG1114510
2-Chlorotoluene	U		0.000375	0.00100	1	05/22/2018 18:51	WG1114510
4-Chlorotoluene	U		0.000351	0.00100	1	05/22/2018 18:51	WG1114510
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	05/22/2018 18:51	WG1114510
1,2-Dibromoethane	U		0.000381	0.00100	1	05/22/2018 18:51	WG1114510
Dibromomethane	U		0.000346	0.00100	1	05/22/2018 18:51	WG1114510

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dichlorobenzene	U		0.000349	0.00100	1	05/22/2018 18:51	WG1114510
1,3-Dichlorobenzene	U		0.000220	0.00100	1	05/22/2018 18:51	WG1114510
1,4-Dichlorobenzene	U		0.000274	0.00100	1	05/22/2018 18:51	WG1114510
Dichlorodifluoromethane	U		0.000551	0.00500	1	05/22/2018 18:51	WG1114510
1,1-Dichloroethane	U		0.000259	0.00100	1	05/22/2018 18:51	WG1114510
1,2-Dichloroethane	U		0.000361	0.00100	1	05/22/2018 18:51	WG1114510
1,1-Dichloroethene	U		0.000398	0.00100	1	05/22/2018 18:51	WG1114510
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	05/22/2018 18:51	WG1114510
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	05/22/2018 18:51	WG1114510
1,2-Dichloropropane	U		0.000306	0.00100	1	05/22/2018 18:51	WG1114510
1,1-Dichloropropene	U		0.000352	0.00100	1	05/22/2018 18:51	WG1114510
1,3-Dichloropropane	U		0.000366	0.00100	1	05/22/2018 18:51	WG1114510
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	05/22/2018 18:51	WG1114510
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	05/22/2018 18:51	WG1114510
2,2-Dichloropropane	U		0.000321	0.00100	1	05/22/2018 18:51	WG1114510
Di-isopropyl ether	U		0.000320	0.00100	1	05/22/2018 18:51	WG1114510
Ethylbenzene	U		0.000384	0.00100	1	05/22/2018 18:51	WG1114510
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	05/22/2018 18:51	WG1114510
Isopropylbenzene	U		0.000326	0.00100	1	05/22/2018 18:51	WG1114510
p-Isopropyltoluene	U		0.000350	0.00100	1	05/22/2018 18:51	WG1114510
2-Butanone (MEK)	U		0.00393	0.0100	1	05/22/2018 18:51	WG1114510
Methylene Chloride	U		0.00100	0.00500	1	05/22/2018 18:51	WG1114510
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	05/22/2018 18:51	WG1114510
Methyl tert-butyl ether	U		0.000367	0.00100	1	05/22/2018 18:51	WG1114510
Naphthalene	U	J3	0.00100	0.00500	1	05/22/2018 18:51	WG1114510
n-Propylbenzene	U		0.000349	0.00100	1	05/22/2018 18:51	WG1114510
Styrene	U		0.000307	0.00100	1	05/22/2018 18:51	WG1114510
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	05/22/2018 18:51	WG1114510
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	05/22/2018 18:51	WG1114510
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	05/22/2018 18:51	WG1114510
Tetrachloroethene	U		0.000372	0.00100	1	05/22/2018 18:51	WG1114510
Toluene	U		0.000412	0.00100	1	05/22/2018 18:51	WG1114510
1,2,3-Trichlorobenzene	U	J3	0.000230	0.00100	1	05/22/2018 18:51	WG1114510
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	05/22/2018 18:51	WG1114510
1,1,1-Trichloroethane	U		0.000319	0.00100	1	05/22/2018 18:51	WG1114510
1,1,2-Trichloroethane	U		0.000383	0.00100	1	05/22/2018 18:51	WG1114510
Trichloroethene	0.0195		0.000398	0.00100	1	05/22/2018 18:51	WG1114510
Trichlorofluoromethane	U		0.00120	0.00500	1	05/22/2018 18:51	WG1114510
1,2,3-Trichloropropane	U		0.000807	0.00250	1	05/22/2018 18:51	WG1114510
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	05/22/2018 18:51	WG1114510
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	05/22/2018 18:51	WG1114510
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	05/22/2018 18:51	WG1114510
Vinyl chloride	U		0.000259	0.00100	1	05/22/2018 18:51	WG1114510
Xylenes, Total	U		0.00106	0.00300	1	05/22/2018 18:51	WG1114510
(S) Toluene-d8	*102*			*80.0-120*		*05/22/2018 18:51*	WG1114510
(S) Dibromofluoromethane	*90.7*			*76.0-123*		*05/22/2018 18:51*	WG1114510
(S) 4-Bromofluorobenzene	*93.1*			*80.0-120*		*05/22/2018 18:51*	WG1114510

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	0.0260	J	0.0100	0.0500	1	05/22/2018 14:19	WG1114542
Acrolein	U		0.00887	0.0500	1	05/22/2018 14:19	WG1114542
Acrylonitrile	U		0.00187	0.0100	1	05/22/2018 14:19	WG1114542
Benzene	U		0.000331	0.00100	1	05/22/2018 14:19	WG1114542
Bromobenzene	U		0.000352	0.00100	1	05/22/2018 14:19	WG1114542
Bromodichloromethane	U		0.000380	0.00100	1	05/22/2018 14:19	WG1114542
Bromoform	U		0.000469	0.00100	1	05/22/2018 14:19	WG1114542
Bromomethane	U		0.000866	0.00500	1	05/22/2018 14:19	WG1114542
n-Butylbenzene	U		0.000361	0.00100	1	05/22/2018 14:19	WG1114542
sec-Butylbenzene	U		0.000365	0.00100	1	05/22/2018 14:19	WG1114542
tert-Butylbenzene	U		0.000399	0.00100	1	05/22/2018 14:19	WG1114542
Carbon tetrachloride	U		0.000379	0.00100	1	05/22/2018 14:19	WG1114542
Chlorobenzene	U		0.000348	0.00100	1	05/22/2018 14:19	WG1114542
Chlorodibromomethane	U		0.000327	0.00100	1	05/22/2018 14:19	WG1114542
Chloroethane	U		0.000453	0.00500	1	05/22/2018 14:19	WG1114542
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	05/22/2018 14:19	WG1114542
Chloroform	U		0.000324	0.00500	1	05/22/2018 14:19	WG1114542
Chloromethane	U		0.000276	0.00250	1	05/22/2018 14:19	WG1114542
2-Chlorotoluene	U		0.000375	0.00100	1	05/22/2018 14:19	WG1114542
4-Chlorotoluene	U		0.000351	0.00100	1	05/22/2018 14:19	WG1114542
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	05/22/2018 14:19	WG1114542
1,2-Dibromoethane	U		0.000381	0.00100	1	05/22/2018 14:19	WG1114542
Dibromomethane	U		0.000346	0.00100	1	05/22/2018 14:19	WG1114542
1,2-Dichlorobenzene	U		0.000349	0.00100	1	05/22/2018 14:19	WG1114542
1,3-Dichlorobenzene	U		0.000220	0.00100	1	05/22/2018 14:19	WG1114542
1,4-Dichlorobenzene	U		0.000274	0.00100	1	05/22/2018 14:19	WG1114542
Dichlorodifluoromethane	U		0.000551	0.00500	1	05/22/2018 14:19	WG1114542
1,1-Dichloroethane	U		0.000259	0.00100	1	05/22/2018 14:19	WG1114542
1,2-Dichloroethane	U		0.000361	0.00100	1	05/22/2018 14:19	WG1114542
1,1-Dichloroethene	U		0.000398	0.00100	1	05/22/2018 14:19	WG1114542
cis-1,2-Dichloroethene	0.000410	J	0.000260	0.00100	1	05/22/2018 14:19	WG1114542
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	05/22/2018 14:19	WG1114542
1,2-Dichloropropane	U		0.000306	0.00100	1	05/22/2018 14:19	WG1114542
1,1-Dichloropropene	U		0.000352	0.00100	1	05/22/2018 14:19	WG1114542
1,3-Dichloropropane	U		0.000366	0.00100	1	05/22/2018 14:19	WG1114542
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	05/22/2018 14:19	WG1114542
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	05/22/2018 14:19	WG1114542
2,2-Dichloropropane	U		0.000321	0.00100	1	05/22/2018 14:19	WG1114542
Di-isopropyl ether	U		0.000320	0.00100	1	05/22/2018 14:19	WG1114542
Ethylbenzene	U		0.000384	0.00100	1	05/22/2018 14:19	WG1114542
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	05/22/2018 14:19	WG1114542
Isopropylbenzene	U		0.000326	0.00100	1	05/22/2018 14:19	WG1114542
p-Isopropyltoluene	U		0.000350	0.00100	1	05/22/2018 14:19	WG1114542
2-Butanone (MEK)	U		0.00393	0.0100	1	05/22/2018 14:19	WG1114542
Methylene Chloride	U		0.00100	0.00500	1	05/22/2018 14:19	WG1114542
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	05/22/2018 14:19	WG1114542
Methyl tert-butyl ether	U		0.000367	0.00100	1	05/22/2018 14:19	WG1114542
Naphthalene	U		0.00100	0.00500	1	05/22/2018 14:19	WG1114542
n-Propylbenzene	U		0.000349	0.00100	1	05/22/2018 14:19	WG1114542
Styrene	U		0.000307	0.00100	1	05/22/2018 14:19	WG1114542
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	05/22/2018 14:19	WG1114542
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	05/22/2018 14:19	WG1114542
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	05/22/2018 14:19	WG1114542
Tetrachloroethene	U		0.000372	0.00100	1	05/22/2018 14:19	WG1114542
Toluene	0.000461	J	0.000412	0.00100	1	05/22/2018 14:19	WG1114542
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	05/22/2018 14:19	WG1114542

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	05/22/2018 14:19	WG1114542
1,1,1-Trichloroethane	U		0.000319	0.00100	1	05/22/2018 14:19	WG1114542
1,1,2-Trichloroethane	U		0.000383	0.00100	1	05/22/2018 14:19	WG1114542
Trichloroethene	U		0.000398	0.00100	1	05/22/2018 14:19	WG1114542
Trichlorofluoromethane	U		0.00120	0.00500	1	05/22/2018 14:19	WG1114542
1,2,3-Trichloropropane	U		0.000807	0.00250	1	05/22/2018 14:19	WG1114542
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	05/22/2018 14:19	WG1114542
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	05/22/2018 14:19	WG1114542
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	05/22/2018 14:19	WG1114542
Vinyl chloride	U		0.000259	0.00100	1	05/22/2018 14:19	WG1114542
Xylenes, Total	0.00128	J	0.00106	0.00300	1	05/22/2018 14:19	WG1114542
(S) Toluene-d8	*96.0*			*80.0-120*		*05/22/2018 14:19*	WG1114542
(S) Dibromofluoromethane	*108*			*76.0-123*		*05/22/2018 14:19*	WG1114542
(S) 4-Bromofluorobenzene	*110*			*80.0-120*		*05/22/2018 14:19*	WG1114542

Wet Chemistry by Method 7199

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hexavalent Chromium-Low Level	0.000191	J5	0.0000200	0.0000600	1	05/25/2018 16:34	WG1115713

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury,Dissolved	U		0.0000490	0.000200	1	05/24/2018 10:38	WG1115429

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:29	WG1115384
Cadmium,Dissolved	U		0.000700	0.00200	1	05/25/2018 13:29	WG1115384
Chromium,Dissolved	U		0.00140	0.0100	1	05/25/2018 13:29	WG1115384
Copper,Dissolved	U		0.00530	0.0100	1	05/25/2018 13:29	WG1115384
Nickel,Dissolved	U		0.00490	0.0100	1	05/25/2018 13:29	WG1115384
Selenium,Dissolved	U		0.00740	0.0100	1	05/25/2018 13:29	WG1115384
Silver,Dissolved	U		0.00280	0.00500	1	05/25/2018 13:29	WG1115384
Zinc,Dissolved	0.0207	J	0.00590	0.0500	1	05/25/2018 13:29	WG1115384

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	0.00103	J	0.000754	0.00200	1	05/25/2018 18:59	WG1115388
Arsenic,Dissolved	0.00119	J	0.000250	0.00200	1	05/25/2018 18:59	WG1115388
Lead,Dissolved	U		0.000240	0.00200	1	05/25/2018 18:59	WG1115388
Thallium,Dissolved	U		0.000190	0.00200	1	05/25/2018 18:59	WG1115388

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	U		0.0100	0.0500	1	05/24/2018 00:10	WG1115415
Acrolein	U	J4	0.00887	0.0500	1	05/24/2018 00:10	WG1115415
Acrylonitrile	U		0.00187	0.0100	1	05/24/2018 00:10	WG1115415
Benzene	U		0.000331	0.00100	1	05/24/2018 00:10	WG1115415
Bromobenzene	U		0.000352	0.00100	1	05/24/2018 00:10	WG1115415
Bromodichloromethane	U		0.000380	0.00100	1	05/24/2018 00:10	WG1115415
Bromoform	U		0.000469	0.00100	1	05/24/2018 00:10	WG1115415
Bromomethane	U		0.000866	0.00500	1	05/24/2018 00:10	WG1115415
n-Butylbenzene	U		0.000361	0.00100	1	05/24/2018 00:10	WG1115415
sec-Butylbenzene	U		0.000365	0.00100	1	05/24/2018 00:10	WG1115415
tert-Butylbenzene	U		0.000399	0.00100	1	05/24/2018 00:10	WG1115415
Carbon tetrachloride	U		0.000379	0.00100	1	05/24/2018 00:10	WG1115415
Chlorobenzene	U		0.000348	0.00100	1	05/24/2018 00:10	WG1115415
Chlorodibromomethane	U		0.000327	0.00100	1	05/24/2018 00:10	WG1115415
Chloroethane	U		0.000453	0.00500	1	05/24/2018 00:10	WG1115415
2-Chloroethyl vinyl ether	U		0.00301	0.0500	1	05/24/2018 00:10	WG1115415
Chloroform	U		0.000324	0.00500	1	05/24/2018 00:10	WG1115415
Chloromethane	U		0.000276	0.00250	1	05/24/2018 00:10	WG1115415
2-Chlorotoluene	U		0.000375	0.00100	1	05/24/2018 00:10	WG1115415
4-Chlorotoluene	U		0.000351	0.00100	1	05/24/2018 00:10	WG1115415
1,2-Dibromo-3-Chloropropane	U	J4	0.00133	0.00500	1	05/24/2018 00:10	WG1115415
1,2-Dibromoethane	U		0.000381	0.00100	1	05/24/2018 00:10	WG1115415
Dibromomethane	U		0.000346	0.00100	1	05/24/2018 00:10	WG1115415

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dichlorobenzene	U		0.000349	0.00100	1	05/24/2018 00:10	WG1115415
1,3-Dichlorobenzene	U		0.000220	0.00100	1	05/24/2018 00:10	WG1115415
1,4-Dichlorobenzene	U		0.000274	0.00100	1	05/24/2018 00:10	WG1115415
Dichlorodifluoromethane	U		0.000551	0.00500	1	05/24/2018 00:10	WG1115415
1,1-Dichloroethane	U		0.000259	0.00100	1	05/24/2018 00:10	WG1115415
1,2-Dichloroethane	U		0.000361	0.00100	1	05/24/2018 00:10	WG1115415
1,1-Dichloroethene	U		0.000398	0.00100	1	05/24/2018 00:10	WG1115415
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	05/24/2018 00:10	WG1115415
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	05/24/2018 00:10	WG1115415
1,2-Dichloropropane	U		0.000306	0.00100	1	05/24/2018 00:10	WG1115415
1,1-Dichloropropene	U		0.000352	0.00100	1	05/24/2018 00:10	WG1115415
1,3-Dichloropropane	U		0.000366	0.00100	1	05/24/2018 00:10	WG1115415
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	05/24/2018 00:10	WG1115415
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	05/24/2018 00:10	WG1115415
2,2-Dichloropropane	U		0.000321	0.00100	1	05/24/2018 00:10	WG1115415
Di-isopropyl ether	U		0.000320	0.00100	1	05/24/2018 00:10	WG1115415
Ethylbenzene	U		0.000384	0.00100	1	05/24/2018 00:10	WG1115415
Hexachloro-1,3-butadiene	U		0.000256	0.00100	1	05/24/2018 00:10	WG1115415
Isopropylbenzene	U		0.000326	0.00100	1	05/24/2018 00:10	WG1115415
p-Isopropyltoluene	U		0.000350	0.00100	1	05/24/2018 00:10	WG1115415
2-Butanone (MEK)	U		0.00393	0.0100	1	05/24/2018 00:10	WG1115415
Methylene Chloride	U		0.00100	0.00500	1	05/24/2018 00:10	WG1115415
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	05/24/2018 00:10	WG1115415
Methyl tert-butyl ether	U		0.000367	0.00100	1	05/24/2018 00:10	WG1115415
Naphthalene	U	J4	0.00100	0.00500	1	05/24/2018 00:10	WG1115415
n-Propylbenzene	U		0.000349	0.00100	1	05/24/2018 00:10	WG1115415
Styrene	U		0.000307	0.00100	1	05/24/2018 00:10	WG1115415
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	05/24/2018 00:10	WG1115415
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	05/24/2018 00:10	WG1115415
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100	1	05/24/2018 00:10	WG1115415
Tetrachloroethene	U		0.000372	0.00100	1	05/24/2018 00:10	WG1115415
Toluene	U		0.000412	0.00100	1	05/24/2018 00:10	WG1115415
1,2,3-Trichlorobenzene	U		0.000230	0.00100	1	05/24/2018 00:10	WG1115415
1,2,4-Trichlorobenzene	U		0.000355	0.00100	1	05/24/2018 00:10	WG1115415
1,1,1-Trichloroethane	U		0.000319	0.00100	1	05/24/2018 00:10	WG1115415
1,1,2-Trichloroethane	U		0.000383	0.00100	1	05/24/2018 00:10	WG1115415
Trichloroethene	0.00666		0.000398	0.00100	1	05/24/2018 00:10	WG1115415
Trichlorofluoromethane	U		0.00120	0.00500	1	05/24/2018 00:10	WG1115415
1,2,3-Trichloropropane	U		0.000807	0.00250	1	05/24/2018 00:10	WG1115415
1,2,4-Trimethylbenzene	U		0.000373	0.00100	1	05/24/2018 00:10	WG1115415
1,2,3-Trimethylbenzene	U		0.000321	0.00100	1	05/24/2018 00:10	WG1115415
1,3,5-Trimethylbenzene	U		0.000387	0.00100	1	05/24/2018 00:10	WG1115415
Vinyl chloride	U		0.000259	0.00100	1	05/24/2018 00:10	WG1115415
Xylenes, Total	U		0.00106	0.00300	1	05/24/2018 00:10	WG1115415
(S) Toluene-d8	*106*			*80.0-120*		*05/24/2018 00:10*	WG1115415
(S) Dibromofluoromethane	*102*			*76.0-123*		*05/24/2018 00:10*	WG1115415
(S) 4-Bromofluorobenzene	*112*			*80.0-120*		*05/24/2018 00:10*	WG1115415

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.1		1	05/24/2018 11:18	WG1115281

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	0.752	J P1	0.752	2.35	1	05/24/2018 12:52	WG1115505

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.53	T8	1	05/24/2018 11:47	WG1115501

Sample Narrative:

L995461-28 WG1115501: 7.53 at 21.8C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	0.322		0.00329	0.0235	1	05/25/2018 08:51	WG1115745

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Antimony	0.903	J	0.881	2.35	1	05/26/2018 13:48	WG1115667
Arsenic	14.4		0.764	2.35	1	05/26/2018 13:48	WG1115667
Beryllium	0.901		0.0823	0.235	1	05/26/2018 13:48	WG1115667
Cadmium	0.974		0.0823	0.588	1	05/26/2018 13:48	WG1115667
Chromium	16.6		0.165	1.18	1	05/26/2018 13:48	WG1115667
Copper	135		0.623	2.35	1	05/26/2018 13:48	WG1115667
Lead	219		0.223	0.588	1	05/26/2018 13:48	WG1115667
Nickel	13.3		0.576	2.35	1	05/26/2018 13:48	WG1115667
Selenium	1.03	J	0.870	2.35	1	05/26/2018 13:48	WG1115667
Silver	0.646	J	0.329	1.18	1	05/26/2018 13:48	WG1115667
Thallium	U		0.764	2.35	1	05/26/2018 13:48	WG1115667
Zinc	135		0.693	5.88	1	05/26/2018 13:48	WG1115667

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U	J4	0.0209	0.0382	1.3	05/25/2018 02:52	WG1115967
Acrylonitrile	U		0.00290	0.0191	1.3	05/25/2018 02:52	WG1115967
Benzene	0.0694		0.000611	0.00153	1.3	05/25/2018 02:52	WG1115967
Bromobenzene	U		0.00160	0.0191	1.3	05/25/2018 02:52	WG1115967
Bromodichloromethane	U		0.00120	0.00382	1.3	05/25/2018 02:52	WG1115967
Bromoform	U		0.00913	0.0382	1.3	05/25/2018 02:52	WG1115967
Bromomethane	U		0.00565	0.0191	1.3	05/25/2018 02:52	WG1115967
n-Butylbenzene	U		0.00586	0.0191	1.3	05/25/2018 02:52	WG1115967
sec-Butylbenzene	U		0.00387	0.0191	1.3	05/25/2018 02:52	WG1115967
tert-Butylbenzene	U		0.00237	0.00764	1.3	05/25/2018 02:52	WG1115967
Carbon tetrachloride	U		0.00165	0.00764	1.3	05/25/2018 02:52	WG1115967
Chlorobenzene	U		0.000876	0.00382	1.3	05/25/2018 02:52	WG1115967
Chlorodibromomethane	U		0.000687	0.00382	1.3	05/25/2018 02:52	WG1115967
Chloroethane	U		0.00165	0.00764	1.3	05/25/2018 02:52	WG1115967

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloroform	U		0.000635	0.00382	1.3	05/25/2018 02:52	WG1115967
Chloromethane	U		0.00213	0.0191	1.3	05/25/2018 02:52	WG1115967
2-Chlorotoluene	U		0.00141	0.00382	1.3	05/25/2018 02:52	WG1115967
4-Chlorotoluene	U		0.00173	0.00764	1.3	05/25/2018 02:52	WG1115967
1,2-Dibromo-3-Chloropropane	U		0.00779	0.0382	1.3	05/25/2018 02:52	WG1115967
1,2-Dibromoethane	U		0.000801	0.00382	1.3	05/25/2018 02:52	WG1115967
Dibromomethane	U		0.00153	0.00764	1.3	05/25/2018 02:52	WG1115967
1,2-Dichlorobenzene	U		0.00221	0.00764	1.3	05/25/2018 02:52	WG1115967
1,3-Dichlorobenzene	U		0.00260	0.00764	1.3	05/25/2018 02:52	WG1115967
1,4-Dichlorobenzene	U		0.00301	0.00764	1.3	05/25/2018 02:52	WG1115967
Dichlorodifluoromethane	U		0.00125	0.00382	1.3	05/25/2018 02:52	WG1115967
1,1-Dichloroethane	U		0.000879	0.00382	1.3	05/25/2018 02:52	WG1115967
1,2-Dichloroethane	U		0.000726	0.00382	1.3	05/25/2018 02:52	WG1115967
1,1-Dichloroethene	U		0.000764	0.00382	1.3	05/25/2018 02:52	WG1115967
cis-1,2-Dichloroethene	U		0.00105	0.00382	1.3	05/25/2018 02:52	WG1115967
trans-1,2-Dichloroethene	U		0.00219	0.00764	1.3	05/25/2018 02:52	WG1115967
1,2-Dichloropropane	U		0.00194	0.00764	1.3	05/25/2018 02:52	WG1115967
1,1-Dichloropropene	U		0.00107	0.00382	1.3	05/25/2018 02:52	WG1115967
1,3-Dichloropropane	U		0.00268	0.00764	1.3	05/25/2018 02:52	WG1115967
cis-1,3-Dichloropropene	U		0.00104	0.00382	1.3	05/25/2018 02:52	WG1115967
trans-1,3-Dichloropropene	U		0.00234	0.00764	1.3	05/25/2018 02:52	WG1115967
2,2-Dichloropropane	U		0.00121	0.00382	1.3	05/25/2018 02:52	WG1115967
Di-isopropyl ether	U		0.000535	0.00153	1.3	05/25/2018 02:52	WG1115967
Ethylbenzene	0.0823		0.000810	0.00382	1.3	05/25/2018 02:52	WG1115967
Hexachloro-1,3-butadiene	U		0.0194	0.0382	1.3	05/25/2018 02:52	WG1115967
Isopropylbenzene	0.0180		0.00132	0.00382	1.3	05/25/2018 02:52	WG1115967
p-Isopropyltoluene	U		0.00356	0.00764	1.3	05/25/2018 02:52	WG1115967
2-Butanone (MEK)	U		0.0190	0.0382	1.3	05/25/2018 02:52	WG1115967
Methylene Chloride	U		0.0101	0.0382	1.3	05/25/2018 02:52	WG1115967
4-Methyl-2-pentanone (MIBK)	U		0.0153	0.0382	1.3	05/25/2018 02:52	WG1115967
Methyl tert-butyl ether	U		0.000451	0.00153	1.3	05/25/2018 02:52	WG1115967
Naphthalene	0.173		0.00477	0.0191	1.3	05/25/2018 02:52	WG1115967
n-Propylbenzene	U		0.00180	0.00764	1.3	05/25/2018 02:52	WG1115967
Styrene	U		0.00417	0.0191	1.3	05/25/2018 02:52	WG1115967
1,1,1,2-Tetrachloroethane	U		0.000764	0.00382	1.3	05/25/2018 02:52	WG1115967
1,1,2,2-Tetrachloroethane	U		0.000596	0.00382	1.3	05/25/2018 02:52	WG1115967
1,1,2-Trichlorotrifluoroethane	U		0.00103	0.00382	1.3	05/25/2018 02:52	WG1115967
Tetrachloroethene	U		0.00107	0.00382	1.3	05/25/2018 02:52	WG1115967
Toluene	0.417		0.00190	0.00764	1.3	05/25/2018 02:52	WG1115967
1,2,3-Trichlorobenzene	U		0.000954	0.00382	1.3	05/25/2018 02:52	WG1115967
1,2,4-Trichlorobenzene	U		0.00737	0.0191	1.3	05/25/2018 02:52	WG1115967
1,1,1-Trichloroethane	U		0.000421	0.00382	1.3	05/25/2018 02:52	WG1115967
1,1,2-Trichloroethane	U		0.00135	0.00382	1.3	05/25/2018 02:52	WG1115967
Trichloroethene	7.06		0.0244	0.0611	52	05/29/2018 11:00	WG1115967-6
Trichlorofluoromethane	U		0.000764	0.00382	1.3	05/25/2018 02:52	WG1115967
1,2,3-Trichloropropane	U		0.00779	0.0191	1.3	05/25/2018 02:52	WG1115967
1,2,4-Trimethylbenzene	0.327		0.00177	0.00764	1.3	05/25/2018 02:52	WG1115967
1,2,3-Trimethylbenzene	0.143		0.00176	0.00764	1.3	05/25/2018 02:52	WG1115967
1,3,5-Trimethylbenzene	0.0989		0.00165	0.00764	1.3	05/25/2018 02:52	WG1115967
Vinyl chloride	U		0.00104	0.00382	1.3	05/25/2018 02:52	WG1115967
Xylenes, Total	1.15		0.00730	0.00993	1.3	05/25/2018 02:52	WG1115967
(S) Toluene-d8	*113*			*80.0-120*		*05/25/2018 02:52*	WG1115967
(S) Toluene-d8	*113*			*80.0-120*		*05/29/2018 11:00*	WG1115967-6
(S) Dibromofluoromethane	*109*			*74.0-131*		*05/25/2018 02:52*	WG1115967
(S) Dibromofluoromethane	*109*			*74.0-131*		*05/29/2018 11:00*	WG1115967-6
(S) 4-Bromofluorobenzene	*111*			*64.0-132*		*05/25/2018 02:52*	WG1115967

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
(S) 4-Bromofluorobenzene	*113*			*64.0-132*		*05/29/2018 11:00*	WG1115967-6

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	82.3		1	05/24/2018 11:18	WG1115281

Wet Chemistry by Method 3060A/7196A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chromium,Hexavalent	0.875	J	0.778	2.43	1	05/24/2018 12:32	WG1115505

Method Blank (MB)

(MB) R3312592-1 05/23/18 11:07

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L995461-02 Original Sample (OS) • Duplicate (DUP)

(OS) L995461-02 05/23/18 11:07 • (DUP) R3312592-3 05/23/18 11:07

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	76.5	75.6	1	1.20		5

Laboratory Control Sample (LCS)

(LCS) R3312592-2 05/23/18 11:07

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3312992-1 05/24/18 11:04

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L995461-13 Original Sample (OS) • Duplicate (DUP)

(OS) L995461-13 05/24/18 11:04 • (DUP) R3312992-3 05/24/18 11:04

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	82.4	82.1	1	0.397		5

Laboratory Control Sample (LCS)

(LCS) R3312992-2 05/24/18 11:04

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3313030-1 05/24/18 10:18

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L995461-15 Original Sample (OS) • Duplicate (DUP)

(OS) L995461-15 05/24/18 10:18 • (DUP) R3313030-3 05/24/18 10:18

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	87.9	87.7	1	0.271		5

Laboratory Control Sample (LCS)

(LCS) R3313030-2 05/24/18 10:18

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3313041-1 05/24/18 11:18

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L995461-28 Original Sample (OS) • Duplicate (DUP)

(OS) L995461-28 05/24/18 11:18 • (DUP) R3313041-3 05/24/18 11:18

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	85.1	84.4	1	0.819		5

Laboratory Control Sample (LCS)

(LCS) R3313041-2 05/24/18 11:18

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3312462-1 05/23/18 15:14

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chromium,Hexavalent	U		0.640	2.00

L995772-03 Original Sample (OS) • Duplicate (DUP)

(OS) L995772-03 05/23/18 15:28 • (DUP) R3312462-4 05/23/18 15:28

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	1.20	1.39	1	14.8	J	20

L995791-01 Original Sample (OS) • Duplicate (DUP)

(OS) L995791-01 05/23/18 15:44 • (DUP) R3312462-9 05/23/18 15:45

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	U	0.000	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312462-2 05/23/18 15:16 • (LCSD) R3312462-3 05/23/18 15:17

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	24.0	22.0	22.1	91.7	92.2	80.0-120			0.544	20

L995772-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995772-08 05/23/18 15:39 • (MS) R3312462-5 05/23/18 15:40 • (MSD) R3312462-6 05/23/18 15:41

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	22.5	U	19.0	19.1	84.2	84.8	1	75.0-125			0.710	20

L995772-08 Original Sample (OS) • Matrix Spike (MS)

(OS) L995772-08 05/23/18 15:39 • (MS) R3312462-7 05/23/18 15:42

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chromium,Hexavalent	753	U	698	92.7	50	75.0-125	

Method Blank (MB)

(MB) R3312789-1 05/24/18 13:29

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chromium,Hexavalent	U		0.640	2.00

L994784-02 Original Sample (OS) • Duplicate (DUP)

(OS) L994784-02 05/24/18 13:32 • (DUP) R3312789-4 05/24/18 13:33

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	ND	0.000	1	0.000		20

L995998-01 Original Sample (OS) • Duplicate (DUP)

(OS) L995998-01 05/24/18 13:59 • (DUP) R3312789-9 05/24/18 14:01

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	ND	11.6	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312789-2 05/24/18 13:31 • (LCSD) R3312789-3 05/24/18 13:31

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	24.0	23.0	22.8	96.0	95.2	80.0-120			0.872	20

L995461-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995461-08 05/24/18 13:43 • (MS) R3312789-5 05/24/18 13:45 • (MSD) R3312789-6 05/24/18 13:47

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	23.3	2.24	ND	ND	0.000	0.000	1	75.0-125	J6	J6	0.000	20

L995461-08 Original Sample (OS) • Matrix Spike (MS)

(OS) L995461-08 05/24/18 13:43 • (MS) R3312789-7 05/24/18 13:49

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chromium,Hexavalent	773	2.24	552	71.4	50	75.0-125	J6

Method Blank (MB)

(MB) R3312742-1 05/24/18 12:25

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chromium,Hexavalent	U		0.640	2.00

L996186-11 Original Sample (OS) • Duplicate (DUP)

(OS) L996186-11 05/24/18 12:43 • (DUP) R3312742-9 05/24/18 12:44

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	ND	1.16	1	0.000		20

L995461-28 Original Sample (OS) • Duplicate (DUP)

(OS) L995461-28 05/24/18 12:52 • (DUP) R3312742-10 05/24/18 12:53

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	0.752	0.000	1	200	P1	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312742-2 05/24/18 12:26 • (LCSD) R3312742-3 05/24/18 12:27

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	24.0	23.3	22.9	97.2	95.3	80.0-120			1.90	20

L996186-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L996186-04 05/24/18 12:39 • (MS) R3312742-5 05/24/18 12:39 • (MSD) R3312742-6 05/24/18 12:40

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	26.6	3.09	23.9	23.8	78.4	78.0	1	75.0-125			0.445	20

L996186-04 Original Sample (OS) • Matrix Spike (MS)

(OS) L996186-04 05/24/18 12:39 • (MS) R3312742-8 05/24/18 12:41

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chromium,Hexavalent	898	3.09	741	82.5	50	75.0-125	

Method Blank (MB)

(MB) R3313641-1 05/29/18 15:38

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chromium,Hexavalent	U		0.640	2.00

L996387-02 Original Sample (OS) • Duplicate (DUP)

(OS) L996387-02 05/29/18 15:53 • (DUP) R3313641-8 05/29/18 15:54

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	ND	0.000	1	0.000		20

L997261-09 Original Sample (OS) • Duplicate (DUP)

(OS) L997261-09 05/29/18 16:03 • (DUP) R3313641-9 05/29/18 16:03

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	U	0.000	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3313641-2 05/29/18 15:38 • (LCSD) R3313641-3 05/29/18 15:38

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	24.0	24.1	23.8	101	99.0	80.0-120			1.50	20

L995461-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995461-08 05/29/18 15:39 • (MS) R3313641-4 05/29/18 15:47 • (MSD) R3313641-5 05/29/18 15:50

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	23.3	U	12.0	8.54	51.2	36.6	1	75.0-125	J6	J3 J6	33.3	20

L995461-08 Original Sample (OS) • Matrix Spike (MS)

(OS) L995461-08 05/29/18 15:39 • (MS) R3313641-6 05/29/18 15:52

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chromium,Hexavalent	773	U	602	77.9	50	75.0-125	

Method Blank (MB)

(MB) R3312110-1 05/22/18 11:47

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hexavalent Chromium-Low Level	U		0.0000200	0.0000600

L994948-02 Original Sample (OS) • Duplicate (DUP)

(OS) L994948-02 05/22/18 13:50 • (DUP) R3312110-4 05/22/18 13:58

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hexavalent Chromium-Low Level	0.00176	0.00173	1	1.96		20

L995461-20 Original Sample (OS) • Duplicate (DUP)

(OS) L995461-20 05/22/18 15:52 • (DUP) R3312110-7 05/22/18 16:01

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hexavalent Chromium-Low Level	U	0.000	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312110-2 05/22/18 11:58 • (LCSD) R3312110-3 05/22/18 12:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hexavalent Chromium-Low Level	0.000500	0.000496	0.000488	99.2	97.6	90.0-110			1.62	20

L995461-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995461-11 05/22/18 15:12 • (MS) R3312110-5 05/22/18 15:20 • (MSD) R3312110-6 05/22/18 15:28

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Hexavalent Chromium-Low Level	0.00100	0.0000572	0.000953	0.00107	89.6	101	1	90.0-110	J6		11.1	20

L995461-25 Original Sample (OS) • Matrix Spike (MS)

(OS) L995461-25 05/22/18 16:44 • (MS) R3312110-8 05/22/18 16:33

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Hexavalent Chromium-Low Level	0.00100	0.0000234	0.00104	102	1	90.0-110	

Method Blank (MB)

(MB) R3313192-1 05/25/18 14:52

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hexavalent Chromium-Low Level	U		0.0000200	0.0000600

L995461-27 Original Sample (OS) • Duplicate (DUP)

(OS) L995461-27 05/25/18 16:34 • (DUP) R3313192-6 05/25/18 16:45

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hexavalent Chromium-Low Level	0.000191	0.000205	1	7.02		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3313192-2 05/25/18 15:02 • (LCSD) R3313192-3 05/25/18 15:10

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hexavalent Chromium-Low Level	0.000500	0.000490	0.000500	98.1	100	90.0-110			2.00	20

L995461-27 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995461-27 05/25/18 16:34 • (MS) R3313192-4 05/25/18 16:16 • (MSD) R3313192-5 05/25/18 16:24

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Hexavalent Chromium-Low Level	0.00100	0.000191	0.00138	0.00133	119	114	1	90.0-110	J5	J5	4.07	20

L995312-01 Original Sample (OS) • Duplicate (DUP)

(OS) L995312-01 05/23/18 08:52 • (DUP) R3312262-3 05/23/18 08:52

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.05	8.07	1	0.248		1

Sample Narrative:

OS: 8.05 at 21.6C

DUP: 8.07 at 21.6C

L995461-02 Original Sample (OS) • Duplicate (DUP)

(OS) L995461-02 05/23/18 08:52 • (DUP) R3312262-4 05/23/18 08:52

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.64	7.68	1	0.522		1

Sample Narrative:

OS: 7.64 at 21.3C

DUP: 7.68 at 21.5C

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312262-1 05/23/18 08:52 • (LCSD) R3312262-2 05/23/18 08:52

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	10.0	10.0	10.0	100	100	99.0-101			0.000	1

Sample Narrative:

LCS: 10 at 20.4C

LCSD: 10 at 20.4C

L995461-12 Original Sample (OS) • Duplicate (DUP)

(OS) L995461-12 05/23/18 08:50 • (DUP) R3312260-3 05/23/18 08:50

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.71	8.64	1	0.807		1

Sample Narrative:

OS: 8.71 at 21.6C

DUP: 8.64 at 22.2C

L995535-03 Original Sample (OS) • Duplicate (DUP)

(OS) L995535-03 05/23/18 08:50 • (DUP) R3312260-4 05/23/18 08:50

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.35	8.35	1	0.000		1

Sample Narrative:

OS: 8.35 at 21.7C

DUP: 8.35 at 21.7C

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312260-1 05/23/18 08:50 • (LCSD) R3312260-2 05/23/18 08:50

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	10.0	10.0	10.0	100	100	99.0-101			0.000	1

Sample Narrative:

LCS: 10 at 20.6C

LCSD: 10 at 20.6C

L995461-28 Original Sample (OS) • Duplicate (DUP)

(OS) L995461-28 05/24/18 11:47 • (DUP) R3312718-3 05/24/18 11:47

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.53	7.50	1	0.399		1

Sample Narrative:

OS: 7.53 at 21.8C

DUP: 7.5 at 21.2C

L996282-02 Original Sample (OS) • Duplicate (DUP)

(OS) L996282-02 05/24/18 11:47 • (DUP) R3312718-4 05/24/18 11:47

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.69	7.69	1	0.000		1

Sample Narrative:

OS: 7.69 at 21.4C

DUP: 7.69 at 21.4C

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312718-1 05/24/18 11:47 • (LCSD) R3312718-2 05/24/18 11:47

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	10.0	9.99	10.0	99.9	100	99.0-101			0.100	1

Sample Narrative:

LCS: 9.99 at 20.6C

LCSD: 10 at 20.7C

Method Blank (MB)

(MB) R3312753-1 05/24/18 10:03

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.0000490	0.000200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312753-2 05/24/18 10:05 • (LCSD) R3312753-3 05/24/18 10:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	0.00332	0.00331	111	110	80.0-120			0.313	20

L995461-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995461-03 05/24/18 10:10 • (MS) R3312753-4 05/24/18 10:13 • (MSD) R3312753-5 05/24/18 10:16

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	U	0.00330	0.00326	110	109	1	75.0-125			1.24	20

Method Blank (MB)

(MB) R3312628-1 05/24/18 07:55

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	U		0.00280	0.0200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312628-5 05/24/18 08:10 • (LCSD) R3312628-2 05/24/18 07:59

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	0.330	0.272	110	90.8	80.0-120			19.2	20

L995461-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995461-01 05/24/18 08:01 • (MS) R3312628-3 05/24/18 08:04 • (MSD) R3312628-4 05/24/18 08:06

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.336	0.0836	0.361	0.380	82.7	88.4	1	75.0-125			5.23	20

Method Blank (MB)

(MB) R3313069-1 05/25/18 08:36

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	U		0.00280	0.0200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3313069-2 05/25/18 08:39 • (LCSD) R3313069-3 05/25/18 08:41

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	0.330	0.330	110	110	80.0-120			0.214	20

L996401-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L996401-01 05/25/18 08:44 • (MS) R3313069-4 05/25/18 08:46 • (MSD) R3313069-5 05/25/18 08:49

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.364	0.107	0.433	0.498	89.7	108	1	75.0-125			14.0	20

Method Blank (MB)

(MB) R3312774-1 05/24/18 11:40

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Antimony	U		0.750	2.00
Arsenic	U		0.650	2.00
Beryllium	U		0.0700	0.200
Cadmium	U		0.0700	0.500
Chromium	U		0.140	1.00
Copper	U		0.530	2.00
Lead	U		0.190	0.500
Nickel	U		0.490	2.00
Selenium	U		0.740	2.00
Silver	U		0.280	1.00
Thallium	U		0.650	2.00
Zinc	U		0.590	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312774-2 05/24/18 11:43 • (LCSD) R3312774-3 05/24/18 11:46

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony	100	97.3	97.4	97.3	97.4	80.0-120			0.0634	20
Arsenic	100	98.2	99.0	98.2	99.0	80.0-120			0.756	20
Beryllium	100	103	103	103	103	80.0-120			0.374	20
Cadmium	100	96.4	97.0	96.4	97.0	80.0-120			0.580	20
Chromium	100	102	101	102	101	80.0-120			0.906	20
Copper	100	102	101	102	101	80.0-120			0.689	20
Lead	100	98.2	99.0	98.2	99.0	80.0-120			0.841	20
Nickel	100	101	101	101	101	80.0-120			0.616	20
Selenium	100	97.6	96.8	97.6	96.8	80.0-120			0.764	20
Silver	20.0	18.5	18.4	92.7	92.0	80.0-120			0.787	20
Thallium	100	96.9	97.5	96.9	97.5	80.0-120			0.617	20
Zinc	100	96.1	96.9	96.1	96.9	80.0-120			0.799	20

L995461-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995461-01 05/24/18 11:49 • (MS) R3312774-6 05/24/18 11:59 • (MSD) R3312774-7 05/24/18 12:03

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	112	U	54.1	53.4	48.3	47.7	1	75.0-125	J6	J6	1.28	20
Arsenic	112	5.74	108	110	91.2	93.5	1	75.0-125			2.35	20

L995461-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995461-01 05/24/18 11:49 • (MS) R3312774-6 05/24/18 11:59 • (MSD) R3312774-7 05/24/18 12:03

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Beryllium	112	0.622	105	106	93.1	94.1	1	75.0-125			1.12	20
Cadmium	112	1.27	103	105	91.3	92.7	1	75.0-125			1.46	20
Chromium	112	15.0	115	117	89.1	91.3	1	75.0-125			2.10	20
Copper	112	13.7	122	125	96.9	99.2	1	75.0-125			2.04	20
Lead	112	51.8	153	162	90.2	98.4	1	75.0-125			5.81	20
Nickel	112	17.1	117	119	89.6	91.2	1	75.0-125			1.46	20
Selenium	112	1.75	104	105	91.3	92.1	1	75.0-125			0.931	20
Silver	22.4	U	19.9	20.4	88.9	91.0	1	75.0-125			2.33	20
Thallium	112	U	102	103	91.1	92.0	1	75.0-125			1.01	20
Zinc	112	94.0	142	147	43.3	47.3	1	75.0-125	J6	J6	3.14	20

Method Blank (MB)

(MB) R3313288-1 05/26/18 13:23

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Antimony	U		0.750	2.00
Arsenic	U		0.650	2.00
Beryllium	U		0.0700	0.200
Cadmium	U		0.0700	0.500
Chromium	U		0.140	1.00
Copper	U		0.530	2.00
Lead	U		0.190	0.500
Nickel	U		0.490	2.00
Selenium	U		0.740	2.00
Silver	U		0.280	1.00
Thallium	U		0.650	2.00
Zinc	U		0.590	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3313288-2 05/26/18 13:26 • (LCSD) R3313288-3 05/26/18 13:29

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony	100	97.2	101	97.2	101	80.0-120			4.19	20
Arsenic	100	98.7	103	98.7	103	80.0-120			4.27	20
Beryllium	100	104	106	104	106	80.0-120			1.35	20
Cadmium	100	97.1	101	97.1	101	80.0-120			3.58	20
Chromium	100	104	105	104	105	80.0-120			1.36	20
Copper	100	103	104	103	104	80.0-120			0.892	20
Lead	100	100	103	100	103	80.0-120			2.71	20
Nickel	100	103	106	103	106	80.0-120			2.31	20
Selenium	100	97.2	102	97.2	102	80.0-120			4.61	20
Silver	20.0	19.1	19.3	95.7	96.4	80.0-120			0.699	20
Thallium	100	97.7	100	97.7	100	80.0-120			2.75	20
Zinc	100	100	103	100	103	80.0-120			2.76	20

L996289-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L996289-02 05/26/18 13:32 • (MS) R3313288-6 05/26/18 13:41 • (MSD) R3313288-7 05/26/18 13:45

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	120	U	38.6	36.7	32.1	30.5	1	75.0-125	J6	J6	5.03	20
Arsenic	120	17.4	133	134	96.3	97.0	1	75.0-125			0.691	20

L996289-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L996289-02 05/26/18 13:32 • (MS) R3313288-6 05/26/18 13:41 • (MSD) R3313288-7 05/26/18 13:45

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Beryllium	120	0.897	123	120	102	98.8	1	75.0-125			2.72	20
Cadmium	120	U	116	113	96.8	93.6	1	75.0-125			3.31	20
Chromium	120	17.1	144	141	105	103	1	75.0-125			2.15	20
Copper	120	14.8	139	137	103	101	1	75.0-125			1.66	20
Lead	120	17.6	140	132	102	95.5	1	75.0-125			5.88	20
Nickel	120	10.2	140	137	108	105	1	75.0-125			2.11	20
Selenium	120	U	117	112	97.5	93.5	1	75.0-125			4.25	20
Silver	24.0	U	22.6	22.1	94.0	92.1	1	75.0-125			2.06	20
Thallium	120	U	114	111	94.9	92.2	1	75.0-125			2.84	20
Zinc	120	25.1	144	142	99.2	97.4	1	75.0-125			1.51	20

Method Blank (MB)

(MB) R3313228-1 05/25/18 12:37

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Beryllium,Dissolved	U		0.000700	0.00200
Cadmium,Dissolved	U		0.000700	0.00200
Chromium,Dissolved	U		0.00140	0.0100
Copper,Dissolved	U		0.00530	0.0100
Nickel,Dissolved	U		0.00490	0.0100
Selenium,Dissolved	U		0.00740	0.0100
Silver,Dissolved	U		0.00280	0.00500
Zinc,Dissolved	U		0.00590	0.0500

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3313228-2 05/25/18 12:39 • (LCSD) R3313228-3 05/25/18 12:42

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Beryllium,Dissolved	1.00	1.02	1.04	102	104	80.0-120			2.08	20
Cadmium,Dissolved	1.00	0.964	0.971	96.4	97.1	80.0-120			0.782	20
Chromium,Dissolved	1.00	0.969	0.974	96.9	97.4	80.0-120			0.431	20
Copper,Dissolved	1.00	1.00	1.01	100	101	80.0-120			0.480	20
Nickel,Dissolved	1.00	0.985	0.989	98.5	98.9	80.0-120			0.440	20
Selenium,Dissolved	1.00	0.948	0.966	94.8	96.6	80.0-120			1.85	20
Silver,Dissolved	0.200	0.189	0.192	94.4	96.0	80.0-120			1.66	20
Zinc,Dissolved	1.00	0.969	0.973	96.9	97.3	80.0-120			0.473	20

L995937-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995937-01 05/25/18 12:44 • (MS) R3313228-5 05/25/18 13:01 • (MSD) R3313228-6 05/25/18 13:03

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Beryllium,Dissolved	1.00	ND	1.03	1.04	103	104	1	75.0-125			0.797	20
Cadmium,Dissolved	1.00	ND	0.961	0.970	96.1	97.0	1	75.0-125			0.952	20
Chromium,Dissolved	1.00	ND	0.969	0.975	96.2	96.8	1	75.0-125			0.603	20
Copper,Dissolved	1.00	ND	0.996	1.01	99.6	101	1	75.0-125			1.23	20
Nickel,Dissolved	1.00	ND	0.999	1.00	99.9	100	1	75.0-125			0.602	20
Selenium,Dissolved	1.00	ND	0.974	0.975	97.4	97.5	1	75.0-125			0.0707	20
Silver,Dissolved	0.200	ND	0.187	0.188	93.7	94.2	1	75.0-125			0.456	20
Zinc,Dissolved	1.00	0.0526	1.02	1.03	97.0	97.9	1	75.0-125			0.911	20

Method Blank (MB)

(MB) R3313216-1 05/25/18 17:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony,Dissolved	U		0.000754	0.00200
Arsenic,Dissolved	U		0.000250	0.00200
Lead,Dissolved	U		0.000240	0.00200
Thallium,Dissolved	U		0.000190	0.00200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3313216-2 05/25/18 17:53 • (LCSD) R3313216-3 05/25/18 17:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	0.0461	0.0474	92.1	94.9	80.0-120			2.97	20
Arsenic,Dissolved	0.0500	0.0491	0.0490	98.2	98.0	80.0-120			0.147	20
Lead,Dissolved	0.0500	0.0474	0.0477	94.8	95.4	80.0-120			0.640	20
Thallium,Dissolved	0.0500	0.0479	0.0484	95.7	96.9	80.0-120			1.20	20

L996260-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L996260-01 05/25/18 18:02 • (MS) R3313216-5 05/25/18 18:11 • (MSD) R3313216-6 05/25/18 18:15

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	ND	0.0474	0.0482	94.8	96.4	1	75.0-125			1.66	20
Arsenic,Dissolved	0.0500	ND	0.0480	0.0492	94.9	97.4	1	75.0-125			2.58	20
Lead,Dissolved	0.0500	ND	0.0470	0.0483	94.0	96.6	1	75.0-125			2.75	20
Thallium,Dissolved	0.0500	ND	0.0467	0.0492	93.4	98.5	1	75.0-125			5.33	20

Method Blank (MB)

(MB) R3312384-3 05/22/18 11:16

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrolein	U		0.00887	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromobenzene	U		0.000352	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
n-Butylbenzene	U		0.000361	0.00100
sec-Butylbenzene	U		0.000365	0.00100
tert-Butylbenzene	U		0.000399	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
2-Chloroethyl vinyl ether	U		0.00301	0.0500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
2-Chlorotoluene	U		0.000375	0.00100
4-Chlorotoluene	U		0.000351	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,3-Dichlorobenzene	U		0.000220	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
Dichlorodifluoromethane	U		0.000551	0.00500
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
1,1-Dichloropropene	U		0.000352	0.00100
1,3-Dichloropropane	U		0.000366	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
2,2-Dichloropropane	U		0.000321	0.00100
Di-isopropyl ether	U		0.000320	0.00100
Ethylbenzene	U		0.000384	0.00100

Method Blank (MB)

(MB) R3312384-3 05/22/18 11:16

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hexachloro-1,3-butadiene	U		0.000256	0.00100
Isopropylbenzene	U		0.000326	0.00100
p-Isopropyltoluene	U		0.000350	0.00100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Methyl tert-butyl ether	U		0.000367	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000349	0.00100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	0.000551	J	0.000372	0.00100
Toluene	U		0.000412	0.00100
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100
1,2,3-Trichlorobenzene	0.000272	J	0.000230	0.00100
1,2,4-Trichlorobenzene	U		0.000355	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
1,2,3-Trimethylbenzene	U		0.000321	0.00100
1,2,4-Trimethylbenzene	U		0.000373	0.00100
1,3,5-Trimethylbenzene	U		0.000387	0.00100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*102*			*80.0-120*
(S) Dibromofluoromethane	*93.1*			*76.0-123*
(S) 4-Bromofluorobenzene	*91.9*			*80.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312384-1 05/22/18 09:02 • (LCSD) R3312384-2 05/22/18 09:22

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.112	0.109	89.5	86.9	10.0-160			2.90	23
Acrolein	0.125	0.136	0.133	109	106	10.0-160			2.16	20
Acrylonitrile	0.125	0.125	0.120	100	96.2	60.0-142			4.18	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312384-1 05/22/18 09:02 • (LCSD) R3312384-2 05/22/18 09:22

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0237	0.0229	94.6	91.6	69.0-123			3.31	20
Bromobenzene	0.0250	0.0239	0.0247	95.4	98.8	79.0-120			3.46	20
Bromodichloromethane	0.0250	0.0251	0.0244	101	97.5	76.0-120			3.08	20
Bromoform	0.0250	0.0231	0.0243	92.5	97.4	67.0-132			5.15	20
Bromomethane	0.0250	0.0288	0.0281	115	112	18.0-160			2.72	20
n-Butylbenzene	0.0250	0.0260	0.0268	104	107	72.0-126			3.38	20
sec-Butylbenzene	0.0250	0.0263	0.0269	105	108	74.0-121			2.15	20
tert-Butylbenzene	0.0250	0.0248	0.0254	99.1	102	75.0-122			2.51	20
Carbon tetrachloride	0.0250	0.0267	0.0256	107	103	63.0-122			4.10	20
Chlorobenzene	0.0250	0.0253	0.0256	101	102	79.0-121			1.31	20
Chlorodibromomethane	0.0250	0.0258	0.0264	103	105	75.0-125			2.17	20
Chloroethane	0.0250	0.0249	0.0234	99.7	93.5	47.0-152			6.34	20
2-Chloroethyl vinyl ether	0.125	0.132	0.135	106	108	10.0-160			2.29	22
Chloroform	0.0250	0.0239	0.0228	95.8	91.3	72.0-121			4.79	20
Chloromethane	0.0250	0.0252	0.0250	101	100	48.0-139			0.750	20
2-Chlorotoluene	0.0250	0.0250	0.0253	100	101	74.0-122			1.11	20
4-Chlorotoluene	0.0250	0.0233	0.0235	93.3	93.9	79.0-120			0.619	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0178	0.0186	71.1	74.2	64.0-127			4.33	20
1,2-Dibromoethane	0.0250	0.0255	0.0256	102	102	77.0-123			0.550	20
Dibromomethane	0.0250	0.0259	0.0252	104	101	78.0-120			2.80	20
1,2-Dichlorobenzene	0.0250	0.0253	0.0257	101	103	80.0-120			1.65	20
1,3-Dichlorobenzene	0.0250	0.0250	0.0255	100	102	72.0-123			1.77	20
1,4-Dichlorobenzene	0.0250	0.0247	0.0247	98.8	98.6	77.0-120			0.198	20
Dichlorodifluoromethane	0.0250	0.0301	0.0292	120	117	49.0-155			3.02	20
1,1-Dichloroethane	0.0250	0.0237	0.0229	94.8	91.5	70.0-126			3.60	20
1,2-Dichloroethane	0.0250	0.0243	0.0236	97.2	94.5	67.0-126			2.72	20
1,1-Dichloroethene	0.0250	0.0247	0.0238	98.9	95.1	64.0-129			3.94	20
cis-1,2-Dichloroethene	0.0250	0.0233	0.0227	93.3	90.8	73.0-120			2.70	20
trans-1,2-Dichloroethene	0.0250	0.0229	0.0226	91.7	90.3	71.0-121			1.51	20
1,2-Dichloropropane	0.0250	0.0259	0.0246	104	98.4	75.0-125			5.23	20
1,1-Dichloropropene	0.0250	0.0250	0.0244	100	97.7	71.0-129			2.47	20
1,3-Dichloropropane	0.0250	0.0243	0.0244	97.2	97.7	80.0-121			0.534	20
cis-1,3-Dichloropropene	0.0250	0.0249	0.0255	99.8	102	79.0-123			2.37	20
trans-1,3-Dichloropropene	0.0250	0.0243	0.0249	97.0	99.5	74.0-127			2.57	20
2,2-Dichloropropane	0.0250	0.0255	0.0252	102	101	60.0-125			1.25	20
Di-isopropyl ether	0.0250	0.0240	0.0232	96.1	92.7	59.0-133			3.60	20
Ethylbenzene	0.0250	0.0263	0.0267	105	107	77.0-120			1.31	20
Hexachloro-1,3-butadiene	0.0250	0.0274	0.0325	110	130	64.0-131			17.1	20
Isopropylbenzene	0.0250	0.0246	0.0250	98.5	99.8	75.0-120			1.36	20
p-Isopropyltoluene	0.0250	0.0264	0.0263	106	105	74.0-126			0.406	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312384-1 05/22/18 09:02 • (LCSD) R3312384-2 05/22/18 09:22

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
2-Butanone (MEK)	0.125	0.113	0.111	90.1	88.7	37.0-158			1.55	20
Methylene Chloride	0.0250	0.0231	0.0226	92.4	90.3	66.0-121			2.38	20
4-Methyl-2-pentanone (MIBK)	0.125	0.117	0.122	93.7	97.7	59.0-143			4.14	20
Methyl tert-butyl ether	0.0250	0.0231	0.0218	92.4	87.3	64.0-123			5.69	20
Naphthalene	0.0250	0.0156	0.0200	62.4	80.0	62.0-128		J3	24.7	20
n-Propylbenzene	0.0250	0.0252	0.0254	101	102	79.0-120			0.787	20
Styrene	0.0250	0.0240	0.0242	96.1	96.9	78.0-124			0.805	20
1,1,1,2-Tetrachloroethane	0.0250	0.0254	0.0251	102	101	75.0-122			1.11	20
1,1,2,2-Tetrachloroethane	0.0250	0.0219	0.0222	87.4	88.7	71.0-122			1.40	20
Tetrachloroethene	0.0250	0.0266	0.0278	106	111	70.0-127			4.46	20
Toluene	0.0250	0.0255	0.0259	102	103	77.0-120			1.54	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0260	0.0252	104	101	61.0-136			2.95	20
1,2,3-Trichlorobenzene	0.0250	0.0177	0.0244	70.7	97.5	61.0-133		J3	31.8	20
1,2,4-Trichlorobenzene	0.0250	0.0237	0.0265	94.9	106	69.0-129			10.9	20
1,1,1-Trichloroethane	0.0250	0.0249	0.0247	99.5	98.9	68.0-122			0.576	20
1,1,2-Trichloroethane	0.0250	0.0258	0.0255	103	102	78.0-120			1.29	20
Trichloroethene	0.0250	0.0265	0.0253	106	101	78.0-120			4.46	20
Trichlorofluoromethane	0.0250	0.0282	0.0272	113	109	56.0-137			3.70	20
1,2,3-Trichloropropane	0.0250	0.0239	0.0240	95.6	95.9	72.0-124			0.263	20
1,2,3-Trimethylbenzene	0.0250	0.0250	0.0252	99.9	101	75.0-120			1.07	20
1,2,4-Trimethylbenzene	0.0250	0.0240	0.0244	96.1	97.7	75.0-120			1.62	20
1,3,5-Trimethylbenzene	0.0250	0.0252	0.0258	101	103	75.0-120			2.60	20
Vinyl chloride	0.0250	0.0292	0.0284	117	114	64.0-133			2.67	20
Xylenes, Total	0.0750	0.0766	0.0768	102	102	77.0-120			0.261	20
(S) Toluene-d8				*99.2*	*102*	*80.0-120*				
(S) Dibromofluoromethane				*90.3*	*89.9*	*76.0-123*				
(S) 4-Bromofluorobenzene				*92.7*	*95.6*	*80.0-120*				

L995435-17 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995435-17 05/24/18 03:41 • (MS) R3312675-1 05/24/18 04:00 • (MSD) R3312675-2 05/24/18 04:19

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	ND	0.122	0.126	97.6	101	1	10.0-139			3.01	25
Acrolein	0.125	ND	0.160	0.169	128	135	1	10.0-160			5.49	25
Acrylonitrile	0.125	ND	0.146	0.147	117	118	1	46.0-159			0.540	23
Benzene	0.0250	ND	0.0247	0.0248	98.7	99.3	1	34.0-147			0.562	20
Bromobenzene	0.0250	ND	0.0262	0.0269	105	107	1	51.0-137			2.42	20
Bromodichloromethane	0.0250	ND	0.0253	0.0258	101	103	1	52.0-135			1.91	20

L995435-17 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995435-17 05/24/18 03:41 • (MS) R3312675-1 05/24/18 04:00 • (MSD) R3312675-2 05/24/18 04:19

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromoform	0.0250	ND	0.0261	0.0270	104	108	1	50.0-146			3.62	20
Bromomethane	0.0250	ND	0.0116	0.0132	46.3	52.9	1	10.0-160			13.3	23
n-Butylbenzene	0.0250	ND	0.0274	0.0276	110	111	1	50.0-144			0.738	20
sec-Butylbenzene	0.0250	ND	0.0285	0.0291	114	117	1	48.0-143			2.34	20
tert-Butylbenzene	0.0250	ND	0.0272	0.0281	109	112	1	50.0-142			3.32	20
Carbon tetrachloride	0.0250	ND	0.0244	0.0249	97.4	99.5	1	41.0-138			2.08	20
Chlorobenzene	0.0250	ND	0.0256	0.0258	103	103	1	52.0-141			0.554	20
Chlorodibromomethane	0.0250	ND	0.0261	0.0259	104	104	1	54.0-142			0.414	20
Chloroethane	0.0250	ND	0.0173	0.0172	69.2	68.8	1	23.0-160			0.547	20
2-Chloroethyl vinyl ether	0.125	ND	ND	ND	0.000	0.000	1	10.0-160	J6	J6	0.000	40
Chloroform	0.0250	ND	0.0255	0.0255	102	102	1	50.0-139			0.178	20
Chloromethane	0.0250	ND	0.0245	0.0246	97.9	98.3	1	14.0-151			0.371	20
2-Chlorotoluene	0.0250	ND	0.0259	0.0268	104	107	1	48.0-142			3.56	20
4-Chlorotoluene	0.0250	ND	0.0261	0.0272	105	109	1	52.0-139			3.88	20
1,2-Dibromo-3-Chloropropane	0.0250	ND	0.0266	0.0269	106	108	1	49.0-144			1.30	24
1,2-Dibromoethane	0.0250	ND	0.0258	0.0267	103	107	1	54.0-140			3.30	20
Dibromomethane	0.0250	ND	0.0248	0.0247	99.4	98.6	1	53.0-138			0.762	20
1,2-Dichlorobenzene	0.0250	ND	0.0277	0.0290	111	116	1	56.0-139			4.45	20
1,3-Dichlorobenzene	0.0250	ND	0.0271	0.0287	109	115	1	50.0-141			5.78	20
1,4-Dichlorobenzene	0.0250	ND	0.0256	0.0263	103	105	1	53.0-136			2.45	20
Dichlorodifluoromethane	0.0250	ND	0.0280	0.0295	112	118	1	20.0-160			5.17	21
1,1-Dichloroethane	0.0250	ND	0.0267	0.0274	107	110	1	47.0-143			2.65	20
1,2-Dichloroethane	0.0250	ND	0.0248	0.0250	99.2	99.8	1	47.0-141			0.619	20
1,1-Dichloroethene	0.0250	ND	0.0257	0.0261	103	105	1	31.0-148			1.81	20
cis-1,2-Dichloroethene	0.0250	ND	0.0248	0.0255	99.3	102	1	43.0-142			2.85	20
trans-1,2-Dichloroethene	0.0250	ND	0.0225	0.0232	89.8	92.8	1	36.0-141			3.23	20
1,2-Dichloropropane	0.0250	ND	0.0272	0.0276	109	110	1	51.0-141			1.20	20
1,1-Dichloropropene	0.0250	ND	0.0261	0.0261	104	104	1	42.0-146			0.122	20
1,3-Dichloropropane	0.0250	ND	0.0253	0.0259	101	104	1	58.0-139			2.33	20
cis-1,3-Dichloropropene	0.0250	ND	0.0258	0.0268	103	107	1	53.0-139			3.75	20
trans-1,3-Dichloropropene	0.0250	ND	0.0244	0.0248	97.4	99.0	1	51.0-143			1.61	20
2,2-Dichloropropane	0.0250	ND	0.0251	0.0249	100	99.5	1	43.0-139			0.993	20
Di-isopropyl ether	0.0250	ND	0.0304	0.0305	122	122	1	44.0-144			0.395	20
Ethylbenzene	0.0250	ND	0.0255	0.0254	102	101	1	42.0-147			0.646	20
Hexachloro-1,3-butadiene	0.0250	ND	0.0268	0.0294	107	118	1	44.0-146			9.43	21
Isopropylbenzene	0.0250	ND	0.0285	0.0292	114	117	1	48.0-141			2.26	20
p-Isopropyltoluene	0.0250	ND	0.0278	0.0281	111	112	1	49.0-146			1.04	20
2-Butanone (MEK)	0.125	ND	0.149	0.154	119	123	1	12.0-149			2.97	24
Methylene Chloride	0.0250	ND	0.0237	0.0242	95.0	96.8	1	42.0-135			1.94	20
4-Methyl-2-pentanone (MIBK)	0.125	ND	0.144	0.145	115	116	1	44.0-160			0.790	22

L995435-17 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995435-17 05/24/18 03:41 • (MS) R3312675-1 05/24/18 04:00 • (MSD) R3312675-2 05/24/18 04:19

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Methyl tert-butyl ether	0.0250	ND	0.0265	0.0267	106	107	1	42.0-142			0.552	20
Naphthalene	0.0250	ND	0.0242	0.0260	96.7	104	1	42.0-146			7.38	24
n-Propylbenzene	0.0250	ND	0.0263	0.0271	105	109	1	47.0-144			3.17	20
Styrene	0.0250	ND	0.0298	0.0311	119	125	1	47.0-147			4.28	20
1,1,1,2-Tetrachloroethane	0.0250	ND	0.0258	0.0260	103	104	1	52.0-140			0.524	20
1,1,2,2-Tetrachloroethane	0.0250	ND	0.0271	0.0289	108	116	1	46.0-149			6.54	20
Tetrachloroethene	0.0250	ND	0.0258	0.0256	103	103	1	38.0-147			0.570	20
Toluene	0.0250	ND	0.0233	0.0231	93.1	92.4	1	42.0-141			0.733	20
1,1,2-Trichlorotrifluoroethane	0.0250	ND	0.0306	0.0304	122	122	1	40.0-151			0.683	21
1,2,3-Trichlorobenzene	0.0250	ND	0.0286	0.0292	114	117	1	45.0-145			2.32	22
1,2,4-Trichlorobenzene	0.0250	ND	0.0290	0.0308	116	123	1	49.0-147			5.96	21
1,1,1-Trichloroethane	0.0250	ND	0.0255	0.0255	102	102	1	46.0-140			0.107	20
1,1,2-Trichloroethane	0.0250	ND	0.0247	0.0252	98.8	101	1	54.0-139			2.16	20
Trichloroethene	0.0250	ND	0.0246	0.0251	98.3	100	1	32.0-156			2.19	20
Trichlorofluoromethane	0.0250	ND	0.0285	0.0289	114	116	1	32.0-152			1.56	20
1,2,3-Trichloropropane	0.0250	ND	0.0269	0.0275	107	110	1	54.0-143			2.13	21
1,2,3-Trimethylbenzene	0.0250	ND	0.0261	0.0274	104	110	1	48.0-138			4.87	20
1,2,4-Trimethylbenzene	0.0250	ND	0.0275	0.0282	110	113	1	41.0-146			2.44	20
1,3,5-Trimethylbenzene	0.0250	ND	0.0274	0.0281	110	112	1	44.0-143			2.22	20
Vinyl chloride	0.0250	ND	0.0235	0.0250	94.2	100	1	24.0-153			5.95	20
Xylenes, Total	0.0750	ND	0.0771	0.0785	103	105	1	41.0-148			1.80	20
(S) Toluene-d8					*101*	*102*		*80.0-120*				
(S) Dibromofluoromethane					*99.9*	*101*		*76.0-123*				
(S) 4-Bromofluorobenzene					*107*	*110*		*80.0-120*				

Method Blank (MB)

(MB) R3312139-4 05/22/18 12:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrolein	U		0.00887	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromobenzene	U		0.000352	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
n-Butylbenzene	U		0.000361	0.00100
sec-Butylbenzene	U		0.000365	0.00100
tert-Butylbenzene	U		0.000399	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
2-Chloroethyl vinyl ether	U		0.00301	0.0500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
2-Chlorotoluene	U		0.000375	0.00100
4-Chlorotoluene	U		0.000351	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,3-Dichlorobenzene	U		0.000220	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
Dichlorodifluoromethane	U		0.000551	0.00500
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
1,1-Dichloropropene	U		0.000352	0.00100
1,3-Dichloropropane	U		0.000366	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
2,2-Dichloropropane	U		0.000321	0.00100
Di-isopropyl ether	U		0.000320	0.00100
Ethylbenzene	U		0.000384	0.00100

Method Blank (MB)

(MB) R3312139-4 05/22/18 12:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hexachloro-1,3-butadiene	0.000627	J	0.000256	0.00100
Isopropylbenzene	U		0.000326	0.00100
p-Isopropyltoluene	U		0.000350	0.00100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Methyl tert-butyl ether	U		0.000367	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000349	0.00100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000412	0.00100
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100
1,2,3-Trichlorobenzene	0.000401	J	0.000230	0.00100
1,2,4-Trichlorobenzene	U		0.000355	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
1,2,3-Trimethylbenzene	U		0.000321	0.00100
1,2,4-Trimethylbenzene	U		0.000373	0.00100
1,3,5-Trimethylbenzene	U		0.000387	0.00100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*94.1*			*80.0-120*
(S) Dibromofluoromethane	*109*			*76.0-123*
(S) 4-Bromofluorobenzene	*111*			*80.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312139-2 05/22/18 10:14 • (LCSD) R3312139-3 05/22/18 10:35

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.130	0.122	104	97.4	10.0-160			6.82	23
Acrolein	0.125	0.115	0.108	92.1	86.0	10.0-160			6.83	20
Acrylonitrile	0.125	0.155	0.147	124	118	60.0-142			5.12	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312139-2 05/22/18 10:14 • (LCSD) R3312139-3 05/22/18 10:35

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0265	0.0269	106	108	69.0-123			1.30	20
Bromobenzene	0.0250	0.0276	0.0295	110	118	79.0-120			6.71	20
Bromodichloromethane	0.0250	0.0241	0.0243	96.4	97.2	76.0-120			0.810	20
Bromoform	0.0250	0.0260	0.0280	104	112	67.0-132			7.37	20
Bromomethane	0.0250	0.0176	0.0184	70.5	73.7	18.0-160			4.48	20
n-Butylbenzene	0.0250	0.0233	0.0247	93.2	98.7	72.0-126			5.70	20
sec-Butylbenzene	0.0250	0.0268	0.0280	107	112	74.0-121			4.43	20
tert-Butylbenzene	0.0250	0.0259	0.0276	103	111	75.0-122			6.59	20
Carbon tetrachloride	0.0250	0.0255	0.0262	102	105	63.0-122			2.52	20
Chlorobenzene	0.0250	0.0231	0.0233	92.5	93.1	79.0-121			0.652	20
Chlorodibromomethane	0.0250	0.0233	0.0235	93.2	94.0	75.0-125			0.811	20
Chloroethane	0.0250	0.0175	0.0181	69.9	72.4	47.0-152			3.49	20
2-Chloroethyl vinyl ether	0.125	0.134	0.137	107	110	10.0-160			2.40	22
Chloroform	0.0250	0.0250	0.0251	100	100	72.0-121			0.0907	20
Chloromethane	0.0250	0.0297	0.0306	119	122	48.0-139			2.81	20
2-Chlorotoluene	0.0250	0.0283	0.0298	113	119	74.0-122			5.08	20
4-Chlorotoluene	0.0250	0.0280	0.0297	112	119	79.0-120			5.89	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0215	0.0220	86.1	87.9	64.0-127			2.05	20
1,2-Dibromoethane	0.0250	0.0235	0.0239	94.1	95.4	77.0-123			1.38	20
Dibromomethane	0.0250	0.0264	0.0266	106	106	78.0-120			0.798	20
1,2-Dichlorobenzene	0.0250	0.0238	0.0246	95.0	98.4	80.0-120			3.53	20
1,3-Dichlorobenzene	0.0250	0.0251	0.0260	100	104	72.0-123			3.52	20
1,4-Dichlorobenzene	0.0250	0.0247	0.0260	98.7	104	77.0-120			5.20	20
Dichlorodifluoromethane	0.0250	0.0233	0.0239	93.3	95.5	49.0-155			2.28	20
1,1-Dichloroethane	0.0250	0.0299	0.0299	120	120	70.0-126			0.00254	20
1,2-Dichloroethane	0.0250	0.0295	0.0291	118	116	67.0-126			1.52	20
1,1-Dichloroethene	0.0250	0.0231	0.0239	92.3	95.7	64.0-129			3.65	20
cis-1,2-Dichloroethene	0.0250	0.0255	0.0254	102	102	73.0-120			0.405	20
trans-1,2-Dichloroethene	0.0250	0.0248	0.0250	99.1	100	71.0-121			1.09	20
1,2-Dichloropropane	0.0250	0.0275	0.0279	110	112	75.0-125			1.26	20
1,1-Dichloropropene	0.0250	0.0287	0.0293	115	117	71.0-129			2.02	20
1,3-Dichloropropane	0.0250	0.0267	0.0266	107	106	80.0-121			0.384	20
cis-1,3-Dichloropropene	0.0250	0.0262	0.0265	105	106	79.0-123			1.08	20
trans-1,3-Dichloropropene	0.0250	0.0257	0.0264	103	106	74.0-127			2.55	20
2,2-Dichloropropane	0.0250	0.0299	0.0296	120	119	60.0-125			0.884	20
Di-isopropyl ether	0.0250	0.0317	0.0313	127	125	59.0-133			1.17	20
Ethylbenzene	0.0250	0.0226	0.0228	90.6	91.2	77.0-120			0.658	20
Hexachloro-1,3-butadiene	0.0250	0.0168	0.0187	67.4	74.8	64.0-131			10.4	20
Isopropylbenzene	0.0250	0.0277	0.0296	111	118	75.0-120			6.41	20
p-Isopropyltoluene	0.0250	0.0240	0.0256	96.1	103	74.0-126			6.52	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312139-2 05/22/18 10:14 • (LCSD) R3312139-3 05/22/18 10:35

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
2-Butanone (MEK)	0.125	0.155	0.150	124	120	37.0-158			3.73	20
Methylene Chloride	0.0250	0.0246	0.0246	98.6	98.5	66.0-121			0.0340	20
4-Methyl-2-pentanone (MIBK)	0.125	0.138	0.133	110	106	59.0-143			3.56	20
Methyl tert-butyl ether	0.0250	0.0285	0.0281	114	112	64.0-123			1.48	20
Naphthalene	0.0250	0.0192	0.0213	76.7	85.2	62.0-128			10.6	20
n-Propylbenzene	0.0250	0.0276	0.0296	111	118	79.0-120			6.92	20
Styrene	0.0250	0.0274	0.0295	110	118	78.0-124			7.25	20
1,1,1,2-Tetrachloroethane	0.0250	0.0235	0.0231	93.9	92.5	75.0-122			1.53	20
1,1,2,2-Tetrachloroethane	0.0250	0.0274	0.0285	110	114	71.0-122			3.84	20
Tetrachloroethene	0.0250	0.0222	0.0223	88.6	89.3	70.0-127			0.750	20
Toluene	0.0250	0.0230	0.0234	92.0	93.6	77.0-120			1.77	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0294	0.0301	118	120	61.0-136			2.22	20
1,2,3-Trichlorobenzene	0.0250	0.0171	0.0195	68.4	77.9	61.0-133			12.9	20
1,2,4-Trichlorobenzene	0.0250	0.0186	0.0205	74.5	82.1	69.0-129			9.67	20
1,1,1-Trichloroethane	0.0250	0.0254	0.0258	102	103	68.0-122			1.43	20
1,1,2-Trichloroethane	0.0250	0.0223	0.0222	89.1	88.8	78.0-120			0.423	20
Trichloroethene	0.0250	0.0233	0.0242	93.0	97.0	78.0-120			4.18	20
Trichlorofluoromethane	0.0250	0.0243	0.0251	97.2	100	56.0-137			3.09	20
1,2,3-Trichloropropane	0.0250	0.0276	0.0288	111	115	72.0-124			4.09	20
1,2,3-Trimethylbenzene	0.0250	0.0256	0.0264	102	106	75.0-120			3.18	20
1,2,4-Trimethylbenzene	0.0250	0.0261	0.0275	105	110	75.0-120			5.16	20
1,3,5-Trimethylbenzene	0.0250	0.0272	0.0287	109	115	75.0-120			5.43	20
Vinyl chloride	0.0250	0.0213	0.0217	85.3	87.0	64.0-133			1.90	20
Xylenes, Total	0.0750	0.0698	0.0701	93.1	93.5	77.0-120			0.429	20
(S) Toluene-d8				*94.6*	*94.9*	*80.0-120*				
(S) Dibromofluoromethane				*108*	*105*	*76.0-123*				
(S) 4-Bromofluorobenzene				*111*	*116*	*80.0-120*				

Method Blank (MB)

(MB) R3312708-3 05/23/18 20:08

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrolein	U		0.00887	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromobenzene	U		0.000352	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
n-Butylbenzene	U		0.000361	0.00100
sec-Butylbenzene	U		0.000365	0.00100
tert-Butylbenzene	U		0.000399	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
2-Chloroethyl vinyl ether	U		0.00301	0.0500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
2-Chlorotoluene	U		0.000375	0.00100
4-Chlorotoluene	U		0.000351	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,3-Dichlorobenzene	U		0.000220	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
Dichlorodifluoromethane	U		0.000551	0.00500
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
1,1-Dichloropropene	U		0.000352	0.00100
1,3-Dichloropropane	U		0.000366	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
2,2-Dichloropropane	U		0.000321	0.00100
Di-isopropyl ether	U		0.000320	0.00100
Ethylbenzene	U		0.000384	0.00100

Method Blank (MB)

(MB) R3312708-3 05/23/18 20:08

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hexachloro-1,3-butadiene	U		0.000256	0.00100
Isopropylbenzene	U		0.000326	0.00100
p-Isopropyltoluene	U		0.000350	0.00100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Methyl tert-butyl ether	U		0.000367	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000349	0.00100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000412	0.00100
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100
1,2,3-Trichlorobenzene	U		0.000230	0.00100
1,2,4-Trichlorobenzene	U		0.000355	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
1,2,3-Trimethylbenzene	U		0.000321	0.00100
1,2,4-Trimethylbenzene	U		0.000373	0.00100
1,3,5-Trimethylbenzene	U		0.000387	0.00100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*109*			*80.0-120*
(S) Dibromofluoromethane	*101*			*76.0-123*
(S) 4-Bromofluorobenzene	*110*			*80.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312708-1 05/23/18 18:28 • (LCSD) R3312708-2 05/23/18 18:48

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.0864	0.0938	69.1	75.1	10.0-160			8.27	23
Acrolein	0.125	0.213	0.177	171	141	10.0-160	J4		18.7	20
Acrylonitrile	0.125	0.141	0.137	113	110	60.0-142			2.90	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312708-1 05/23/18 18:28 • (LCSD) R3312708-2 05/23/18 18:48

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0213	0.0219	85.3	87.5	69.0-123			2.61	20
Bromobenzene	0.0250	0.0224	0.0231	89.8	92.4	79.0-120			2.91	20
Bromodichloromethane	0.0250	0.0192	0.0195	76.8	77.9	76.0-120			1.41	20
Bromoform	0.0250	0.0285	0.0290	114	116	67.0-132			2.04	20
Bromomethane	0.0250	0.0247	0.0261	98.8	104	18.0-160			5.65	20
n-Butylbenzene	0.0250	0.0226	0.0245	90.5	98.0	72.0-126			7.92	20
sec-Butylbenzene	0.0250	0.0215	0.0237	86.0	94.9	74.0-121			9.82	20
tert-Butylbenzene	0.0250	0.0236	0.0252	94.4	101	75.0-122			6.69	20
Carbon tetrachloride	0.0250	0.0226	0.0232	90.2	92.9	63.0-122			2.97	20
Chlorobenzene	0.0250	0.0241	0.0241	96.5	96.6	79.0-121			0.0483	20
Chlorodibromomethane	0.0250	0.0253	0.0255	101	102	75.0-125			0.883	20
Chloroethane	0.0250	0.0198	0.0191	79.3	76.2	47.0-152			3.91	20
2-Chloroethyl vinyl ether	0.125	0.142	0.139	114	111	10.0-160			2.07	22
Chloroform	0.0250	0.0216	0.0219	86.4	87.5	72.0-121			1.22	20
Chloromethane	0.0250	0.0177	0.0192	70.8	76.7	48.0-139			7.99	20
2-Chlorotoluene	0.0250	0.0232	0.0242	92.9	96.8	74.0-122			4.09	20
4-Chlorotoluene	0.0250	0.0225	0.0228	90.0	91.2	79.0-120			1.30	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0347	0.0358	139	143	64.0-127	J4	J4	3.15	20
1,2-Dibromoethane	0.0250	0.0267	0.0263	107	105	77.0-123			1.26	20
Dibromomethane	0.0250	0.0230	0.0236	91.8	94.2	78.0-120			2.59	20
1,2-Dichlorobenzene	0.0250	0.0241	0.0252	96.5	101	80.0-120			4.41	20
1,3-Dichlorobenzene	0.0250	0.0236	0.0249	94.2	99.5	72.0-123			5.46	20
1,4-Dichlorobenzene	0.0250	0.0232	0.0245	92.6	97.8	77.0-120			5.43	20
Dichlorodifluoromethane	0.0250	0.0234	0.0255	93.7	102	49.0-155			8.50	20
1,1-Dichloroethane	0.0250	0.0207	0.0207	82.8	83.0	70.0-126			0.227	20
1,2-Dichloroethane	0.0250	0.0220	0.0218	87.9	87.4	67.0-126			0.543	20
1,1-Dichloroethene	0.0250	0.0215	0.0221	86.1	88.3	64.0-129			2.50	20
cis-1,2-Dichloroethene	0.0250	0.0205	0.0219	82.1	87.5	73.0-120			6.28	20
trans-1,2-Dichloroethene	0.0250	0.0216	0.0230	86.4	92.0	71.0-121			6.22	20
1,2-Dichloropropane	0.0250	0.0202	0.0205	80.8	82.0	75.0-125			1.50	20
1,1-Dichloropropene	0.0250	0.0231	0.0244	92.3	97.5	71.0-129			5.47	20
1,3-Dichloropropane	0.0250	0.0241	0.0238	96.6	95.2	80.0-121			1.42	20
cis-1,3-Dichloropropene	0.0250	0.0283	0.0282	113	113	79.0-123			0.195	20
trans-1,3-Dichloropropene	0.0250	0.0280	0.0279	112	111	74.0-127			0.295	20
2,2-Dichloropropane	0.0250	0.0235	0.0248	94.2	99.4	60.0-125			5.36	20
Di-isopropyl ether	0.0250	0.0173	0.0179	69.1	71.4	59.0-133			3.35	20
Ethylbenzene	0.0250	0.0245	0.0245	98.1	98.1	77.0-120			0.00905	20
Hexachloro-1,3-butadiene	0.0250	0.0260	0.0291	104	116	64.0-131			11.3	20
Isopropylbenzene	0.0250	0.0259	0.0271	103	109	75.0-120			4.80	20
p-Isopropyltoluene	0.0250	0.0235	0.0255	94.0	102	74.0-126			8.00	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312708-1 05/23/18 18:28 • (LCSD) R3312708-2 05/23/18 18:48

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
2-Butanone (MEK)	0.125	0.112	0.111	89.3	88.6	37.0-158			0.823	20
Methylene Chloride	0.0250	0.0212	0.0219	84.7	87.7	66.0-121			3.51	20
4-Methyl-2-pentanone (MIBK)	0.125	0.121	0.116	96.6	93.1	59.0-143			3.71	20
Methyl tert-butyl ether	0.0250	0.0202	0.0201	80.9	80.4	64.0-123			0.599	20
Naphthalene	0.0250	0.0315	0.0337	126	135	62.0-128		J4	6.55	20
n-Propylbenzene	0.0250	0.0248	0.0261	99.3	105	79.0-120			5.17	20
Styrene	0.0250	0.0249	0.0251	99.6	100	78.0-124			0.642	20
1,1,1,2-Tetrachloroethane	0.0250	0.0253	0.0254	101	102	75.0-122			0.510	20
1,1,2,2-Tetrachloroethane	0.0250	0.0248	0.0246	99.3	98.3	71.0-122			0.950	20
Tetrachloroethene	0.0250	0.0261	0.0278	104	111	70.0-127			6.47	20
Toluene	0.0250	0.0230	0.0234	92.1	93.7	77.0-120			1.68	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0234	0.0247	93.8	98.7	61.0-136			5.11	20
1,2,3-Trichlorobenzene	0.0250	0.0299	0.0321	120	129	61.0-133			7.30	20
1,2,4-Trichlorobenzene	0.0250	0.0268	0.0298	107	119	69.0-129			10.9	20
1,1,1-Trichloroethane	0.0250	0.0211	0.0218	84.3	87.4	68.0-122			3.63	20
1,1,2-Trichloroethane	0.0250	0.0229	0.0228	91.7	91.2	78.0-120			0.497	20
Trichloroethene	0.0250	0.0230	0.0248	92.1	99.4	78.0-120			7.56	20
Trichlorofluoromethane	0.0250	0.0234	0.0251	93.5	100	56.0-137			7.24	20
1,2,3-Trichloropropane	0.0250	0.0278	0.0279	111	111	72.0-124			0.266	20
1,2,3-Trimethylbenzene	0.0250	0.0234	0.0251	93.7	101	75.0-120			7.09	20
1,2,4-Trimethylbenzene	0.0250	0.0216	0.0229	86.6	91.7	75.0-120			5.75	20
1,3,5-Trimethylbenzene	0.0250	0.0226	0.0242	90.4	96.8	75.0-120			6.83	20
Vinyl chloride	0.0250	0.0231	0.0247	92.3	98.9	64.0-133			6.89	20
Xylenes, Total	0.0750	0.0707	0.0724	94.3	96.5	77.0-120			2.38	20
(S) Toluene-d8				*111*	*108*	*80.0-120*				
(S) Dibromofluoromethane				*97.6*	*95.9*	*76.0-123*				
(S) 4-Bromofluorobenzene				*109*	*108*	*80.0-120*				

Method Blank (MB)

(MB) R3312574-3 05/23/18 12:10

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acetone	U		0.0137	0.0250
Acrylonitrile	U		0.00190	0.0125
Benzene	U		0.000400	0.00100
Bromobenzene	U		0.00105	0.0125
Bromodichloromethane	U		0.000788	0.00250
Bromoform	U		0.00598	0.0250
Bromomethane	U		0.00370	0.0125
n-Butylbenzene	U		0.00384	0.0125
sec-Butylbenzene	U		0.00253	0.0125
tert-Butylbenzene	U		0.00155	0.00500
Carbon tetrachloride	U		0.00108	0.00500
Chlorobenzene	U		0.000573	0.00250
Chlorodibromomethane	U		0.000450	0.00250
Chloroethane	U		0.00108	0.00500
Chloroform	U		0.000415	0.00250
Chloromethane	U		0.00139	0.0125
2-Chlorotoluene	U		0.000920	0.00250
4-Chlorotoluene	U		0.00113	0.00500
1,2-Dibromo-3-Chloropropane	U		0.00510	0.0250
1,2-Dibromoethane	U		0.000525	0.00250
Dibromomethane	U		0.00100	0.00500
1,2-Dichlorobenzene	U		0.00145	0.00500
1,3-Dichlorobenzene	U		0.00170	0.00500
1,4-Dichlorobenzene	U		0.00197	0.00500
Dichlorodifluoromethane	U		0.000818	0.00250
1,1-Dichloroethane	U		0.000575	0.00250
1,2-Dichloroethane	U		0.000475	0.00250
1,1-Dichloroethene	U		0.000500	0.00250
cis-1,2-Dichloroethene	U		0.000690	0.00250
trans-1,2-Dichloroethene	U		0.00143	0.00500
1,2-Dichloropropane	U		0.00127	0.00500
1,1-Dichloropropene	U		0.000700	0.00250
1,3-Dichloropropane	U		0.00175	0.00500
cis-1,3-Dichloropropene	U		0.000678	0.00250
trans-1,3-Dichloropropene	U		0.00153	0.00500
2,2-Dichloropropane	U		0.000793	0.00250
Di-isopropyl ether	U		0.000350	0.00100
Ethylbenzene	U		0.000530	0.00250
Hexachloro-1,3-butadiene	U		0.0127	0.0250
Isopropylbenzene	U		0.000863	0.00250

Method Blank (MB)

(MB) R3312574-3 05/23/18 12:10

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
p-Isopropyltoluene	U		0.00233	0.00500
2-Butanone (MEK)	U		0.0125	0.0250
Methylene Chloride	U		0.00664	0.0250
4-Methyl-2-pentanone (MIBK)	U		0.0100	0.0250
Methyl tert-butyl ether	U		0.000295	0.00100
Naphthalene	U		0.00312	0.0125
n-Propylbenzene	U		0.00118	0.00500
Styrene	U		0.00273	0.0125
1,1,1,2-Tetrachloroethane	U		0.000500	0.00250
1,1,2,2-Tetrachloroethane	U		0.000390	0.00250
Tetrachloroethene	U		0.000700	0.00250
Toluene	U		0.00125	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000675	0.00250
1,2,3-Trichlorobenzene	U		0.000625	0.00250
1,2,4-Trichlorobenzene	U		0.00482	0.0125
1,1,1-Trichloroethane	U		0.000275	0.00250
1,1,2-Trichloroethane	U		0.000883	0.00250
Trichloroethene	U		0.000400	0.00100
Trichlorofluoromethane	U		0.000500	0.00250
1,2,3-Trichloropropane	U		0.00510	0.0125
1,2,3-Trimethylbenzene	U		0.00115	0.00500
1,2,4-Trimethylbenzene	U		0.00116	0.00500
1,3,5-Trimethylbenzene	U		0.00108	0.00500
Vinyl chloride	U		0.000683	0.00250
Xylenes, Total	U		0.00478	0.00650
(S) Toluene-d8	*115*			*80.0-120*
(S) Dibromofluoromethane	*108*			*74.0-131*
(S) 4-Bromofluorobenzene	*113*			*64.0-132*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312574-1 05/23/18 10:32 • (LCSD) R3312574-2 05/23/18 10:53

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.625	0.640	0.403	102	64.6	11.0-160		J3	45.3	23
Acrylonitrile	0.625	0.647	0.619	104	99.0	61.0-143			4.50	20
Benzene	0.125	0.109	0.112	87.3	89.8	71.0-124			2.87	20
Bromobenzene	0.125	0.134	0.125	108	99.9	78.0-120			7.34	20
Bromodichloromethane	0.125	0.117	0.117	93.6	93.9	75.0-120			0.348	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312574-1 05/23/18 10:32 • (LCSD) R3312574-2 05/23/18 10:53

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromoform	0.125	0.121	0.109	96.6	87.1	65.0-133			10.3	20
Bromomethane	0.125	0.112	0.119	89.9	94.8	26.0-160			5.32	20
n-Butylbenzene	0.125	0.132	0.136	106	109	73.0-126			3.01	20
sec-Butylbenzene	0.125	0.127	0.131	101	105	75.0-121			3.29	20
tert-Butylbenzene	0.125	0.138	0.138	110	110	74.0-122			0.0509	20
Carbon tetrachloride	0.125	0.120	0.133	95.8	107	66.0-123			10.7	20
Chlorobenzene	0.125	0.107	0.115	86.0	92.3	79.0-121			7.15	20
Chlorodibromomethane	0.125	0.111	0.105	88.7	84.1	74.0-128			5.37	20
Chloroethane	0.125	0.112	0.119	89.4	95.6	51.0-147			6.68	20
Chloroform	0.125	0.113	0.114	90.1	91.0	73.0-123			0.941	20
Chloromethane	0.125	0.120	0.124	95.6	99.0	51.0-138			3.50	20
2-Chlorotoluene	0.125	0.118	0.125	94.5	100	72.0-124			5.75	20
4-Chlorotoluene	0.125	0.152	0.132	122	105	78.0-120	J4		14.5	20
1,2-Dibromo-3-Chloropropane	0.125	0.114	0.0980	91.2	78.4	65.0-126			15.0	20
1,2-Dibromoethane	0.125	0.123	0.119	98.3	95.0	78.0-122			3.49	20
Dibromomethane	0.125	0.111	0.118	88.5	94.7	79.0-120			6.66	20
1,2-Dichlorobenzene	0.125	0.117	0.104	93.3	82.9	80.0-120			11.8	20
1,3-Dichlorobenzene	0.125	0.121	0.114	96.6	91.3	72.0-123			5.65	20
1,4-Dichlorobenzene	0.125	0.118	0.115	94.7	92.1	77.0-120			2.74	20
Dichlorodifluoromethane	0.125	0.126	0.116	101	92.6	49.0-155			8.34	20
1,1-Dichloroethane	0.125	0.116	0.129	92.9	103	70.0-128			10.5	20
1,2-Dichloroethane	0.125	0.147	0.145	117	116	69.0-128			1.34	20
1,1-Dichloroethene	0.125	0.126	0.139	101	111	63.0-131			10.0	20
cis-1,2-Dichloroethene	0.125	0.109	0.107	87.6	85.7	74.0-123			2.12	20
trans-1,2-Dichloroethene	0.125	0.101	0.114	81.1	91.2	72.0-122			11.8	20
1,2-Dichloropropane	0.125	0.122	0.127	97.2	102	75.0-126			4.73	20
1,1-Dichloropropene	0.125	0.128	0.132	102	105	72.0-130			3.10	20
1,3-Dichloropropane	0.125	0.122	0.132	97.8	106	80.0-121			7.86	20
cis-1,3-Dichloropropene	0.125	0.114	0.110	91.4	87.8	80.0-125			4.02	20
trans-1,3-Dichloropropene	0.125	0.116	0.114	93.0	91.1	75.0-129			2.10	20
2,2-Dichloropropane	0.125	0.128	0.144	103	115	60.0-129			11.6	20
Di-isopropyl ether	0.125	0.129	0.132	103	105	62.0-133			2.07	20
Ethylbenzene	0.125	0.124	0.123	99.4	98.0	77.0-120			1.47	20
Hexachloro-1,3-butadiene	0.125	0.134	0.132	107	106	68.0-128			1.71	20
Isopropylbenzene	0.125	0.131	0.133	105	106	75.0-120			1.29	20
p-Isopropyltoluene	0.125	0.129	0.126	103	101	74.0-125			2.74	20
2-Butanone (MEK)	0.625	0.431	0.498	69.0	79.7	37.0-159			14.4	21.3
Methylene Chloride	0.125	0.105	0.110	83.8	87.7	67.0-123			4.62	20
4-Methyl-2-pentanone (MIBK)	0.625	0.759	0.694	121	111	60.0-144			9.00	20
Methyl tert-butyl ether	0.125	0.111	0.123	88.6	98.8	66.0-125			10.8	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312574-1 05/23/18 10:32 • (LCSD) R3312574-2 05/23/18 10:53

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Naphthalene	0.125	0.103	0.0955	82.6	76.4	64.0-125			7.81	20
n-Propylbenzene	0.125	0.136	0.138	108	110	78.0-120			1.88	20
Styrene	0.125	0.121	0.118	96.8	94.4	78.0-124			2.54	20
1,1,1,2-Tetrachloroethane	0.125	0.106	0.108	84.7	86.5	74.0-124			2.08	20
1,1,2,2-Tetrachloroethane	0.125	0.119	0.115	95.4	91.7	73.0-120			3.92	20
Tetrachloroethene	0.125	0.129	0.113	103	90.1	70.0-127			13.4	20
Toluene	0.125	0.118	0.117	94.2	93.5	70.0-120			0.799	20
1,1,2-Trichlorotrifluoroethane	0.125	0.0985	0.106	78.8	84.7	64.0-135			7.28	20
1,2,3-Trichlorobenzene	0.125	0.105	0.102	84.3	81.7	68.0-126			3.12	20
1,2,4-Trichlorobenzene	0.125	0.112	0.108	89.6	86.8	70.0-127			3.20	20
1,1,1-Trichloroethane	0.125	0.125	0.134	99.8	107	69.0-125			7.43	20
1,1,2-Trichloroethane	0.125	0.127	0.127	101	102	78.0-120			0.182	20
Trichloroethene	0.125	0.104	0.120	83.3	96.4	79.0-120			14.6	20
Trichlorofluoromethane	0.125	0.131	0.136	105	109	59.0-136			3.50	20
1,2,3-Trichloropropane	0.125	0.134	0.112	107	89.7	73.0-124			17.9	20
1,2,3-Trimethylbenzene	0.125	0.131	0.137	105	110	76.0-120			4.57	20
1,2,4-Trimethylbenzene	0.125	0.134	0.129	108	103	75.0-120			4.08	20
1,3,5-Trimethylbenzene	0.125	0.130	0.131	104	105	75.0-120			0.689	20
Vinyl chloride	0.125	0.118	0.132	94.3	106	63.0-134			11.6	20
Xylenes, Total	0.375	0.330	0.340	88.0	90.7	77.0-120			2.99	20
(S) Toluene-d8				*110*	*107*	*80.0-120*				
(S) Dibromofluoromethane				*88.2*	*92.7*	*74.0-131*				
(S) 4-Bromofluorobenzene				*123*	*119*	*64.0-132*				

Method Blank (MB)

(MB) R3312891-3 05/24/18 11:12

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
1,2-Dichloropropane	U		0.00127	0.00500
Trichloroethene	U		0.000400	0.00100
(S) Toluene-d8	*103*			*80.0-120*
(S) Dibromofluoromethane	*86.1*			*74.0-131*
(S) 4-Bromofluorobenzene	*112*			*64.0-132*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312891-1 05/24/18 09:53 • (LCSD) R3312891-2 05/24/18 10:12

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,2-Dichloropropane	0.125	0.118	0.119	94.6	95.5	75.0-126			0.963	20
Trichloroethene	0.125	0.133	0.132	107	105	79.0-120			1.44	20
(S) Toluene-d8				*104*	*106*	*80.0-120*				
(S) Dibromofluoromethane				*99.7*	*100*	*74.0-131*				
(S) 4-Bromofluorobenzene				*108*	*107*	*64.0-132*				

Method Blank (MB)

(MB) R3313015-3 05/24/18 23:01

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acetone	U		0.0137	0.0250
Acrylonitrile	U		0.00190	0.0125
Benzene	U		0.000400	0.00100
Bromobenzene	U		0.00105	0.0125
Bromodichloromethane	U		0.000788	0.00250
Bromoform	U		0.00598	0.0250
Bromomethane	U		0.00370	0.0125
n-Butylbenzene	U		0.00384	0.0125
sec-Butylbenzene	U		0.00253	0.0125
tert-Butylbenzene	U		0.00155	0.00500
Carbon tetrachloride	U		0.00108	0.00500
Chlorobenzene	U		0.000573	0.00250
Chlorodibromomethane	U		0.000450	0.00250
Chloroethane	U		0.00108	0.00500
Chloroform	U		0.000415	0.00250
Chloromethane	U		0.00139	0.0125
2-Chlorotoluene	U		0.000920	0.00250
4-Chlorotoluene	U		0.00113	0.00500
1,2-Dibromo-3-Chloropropane	U		0.00510	0.0250
1,2-Dibromoethane	U		0.000525	0.00250
Dibromomethane	U		0.00100	0.00500
1,2-Dichlorobenzene	U		0.00145	0.00500
1,3-Dichlorobenzene	U		0.00170	0.00500
1,4-Dichlorobenzene	U		0.00197	0.00500
Dichlorodifluoromethane	U		0.000818	0.00250
1,1-Dichloroethane	U		0.000575	0.00250
1,2-Dichloroethane	U		0.000475	0.00250
1,1-Dichloroethene	U		0.000500	0.00250
cis-1,2-Dichloroethene	U		0.000690	0.00250
trans-1,2-Dichloroethene	U		0.00143	0.00500
1,2-Dichloropropane	U		0.00127	0.00500
1,1-Dichloropropene	U		0.000700	0.00250
1,3-Dichloropropane	U		0.00175	0.00500
cis-1,3-Dichloropropene	U		0.000678	0.00250
trans-1,3-Dichloropropene	U		0.00153	0.00500
2,2-Dichloropropane	U		0.000793	0.00250
Di-isopropyl ether	U		0.000350	0.00100
Ethylbenzene	U		0.000530	0.00250
Hexachloro-1,3-butadiene	U		0.0127	0.0250
Isopropylbenzene	U		0.000863	0.00250

Method Blank (MB)

(MB) R3313015-3 05/24/18 23:01

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
p-Isopropyltoluene	U		0.00233	0.00500
2-Butanone (MEK)	U		0.0125	0.0250
Methylene Chloride	0.00750	J	0.00664	0.0250
4-Methyl-2-pentanone (MIBK)	U		0.0100	0.0250
Methyl tert-butyl ether	U		0.000295	0.00100
Naphthalene	U		0.00312	0.0125
n-Propylbenzene	U		0.00118	0.00500
Styrene	U		0.00273	0.0125
1,1,1,2-Tetrachloroethane	U		0.000500	0.00250
1,1,2,2-Tetrachloroethane	U		0.000390	0.00250
Tetrachloroethene	U		0.000700	0.00250
Toluene	U		0.00125	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000675	0.00250
1,2,3-Trichlorobenzene	U		0.000625	0.00250
1,2,4-Trichlorobenzene	U		0.00482	0.0125
1,1,1-Trichloroethane	U		0.000275	0.00250
1,1,2-Trichloroethane	U		0.000883	0.00250
Trichlorofluoromethane	U		0.000500	0.00250
1,2,3-Trichloropropane	U		0.00510	0.0125
1,2,3-Trimethylbenzene	U		0.00115	0.00500
1,2,4-Trimethylbenzene	U		0.00116	0.00500
1,3,5-Trimethylbenzene	U		0.00108	0.00500
Vinyl chloride	U		0.000683	0.00250
Xylenes, Total	U		0.00478	0.00650
(S) Toluene-d8	*116*			*80.0-120*
(S) Dibromofluoromethane	*99.0*			*74.0-131*
(S) 4-Bromofluorobenzene	*115*			*64.0-132*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3313015-1 05/24/18 21:15 • (LCSD) R3313015-2 05/24/18 21:49

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.625	0.985	1.01	158	161	11.0-160		J4	2.31	23
Acrylonitrile	0.625	0.804	0.811	129	130	61.0-143			0.756	20
Benzene	0.125	0.123	0.120	98.1	96.4	71.0-124			1.71	20
Bromobenzene	0.125	0.122	0.119	97.6	95.5	78.0-120			2.20	20
Bromodichloromethane	0.125	0.124	0.126	99.2	101	75.0-120			1.71	20
Bromoform	0.125	0.118	0.115	94.4	92.4	65.0-133			2.17	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3313015-1 05/24/18 21:15 • (LCSD) R3313015-2 05/24/18 21:49

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromomethane	0.125	0.105	0.108	84.0	86.7	26.0-160			3.15	20
n-Butylbenzene	0.125	0.128	0.126	103	101	73.0-126			1.86	20
sec-Butylbenzene	0.125	0.119	0.116	95.2	92.7	75.0-121			2.70	20
tert-Butylbenzene	0.125	0.119	0.117	94.9	93.6	74.0-122			1.35	20
Carbon tetrachloride	0.125	0.140	0.140	112	112	66.0-123			0.128	20
Chlorobenzene	0.125	0.115	0.114	92.2	91.1	79.0-121			1.26	20
Chlorodibromomethane	0.125	0.112	0.114	89.6	91.0	74.0-128			1.47	20
Chloroethane	0.125	0.101	0.104	81.1	83.3	51.0-147			2.66	20
Chloroform	0.125	0.124	0.127	99.3	102	73.0-123			2.28	20
Chloromethane	0.125	0.118	0.118	94.3	94.2	51.0-138			0.0807	20
2-Chlorotoluene	0.125	0.119	0.118	95.3	94.5	72.0-124			0.842	20
4-Chlorotoluene	0.125	0.118	0.114	94.4	91.4	78.0-120			3.25	20
1,2-Dibromo-3-Chloropropane	0.125	0.128	0.132	102	106	65.0-126			3.69	20
1,2-Dibromoethane	0.125	0.113	0.115	90.2	91.8	78.0-122			1.66	20
Dibromomethane	0.125	0.128	0.128	103	102	79.0-120			0.582	20
1,2-Dichlorobenzene	0.125	0.118	0.121	94.4	96.6	80.0-120			2.35	20
1,3-Dichlorobenzene	0.125	0.122	0.121	97.4	96.5	72.0-123			0.931	20
1,4-Dichlorobenzene	0.125	0.113	0.115	90.4	91.9	77.0-120			1.63	20
Dichlorodifluoromethane	0.125	0.141	0.138	113	110	49.0-155			2.28	20
1,1-Dichloroethane	0.125	0.124	0.121	99.0	97.2	70.0-128			1.87	20
1,2-Dichloroethane	0.125	0.129	0.130	103	104	69.0-128			1.21	20
1,1-Dichloroethene	0.125	0.135	0.135	108	108	63.0-131			0.0481	20
cis-1,2-Dichloroethene	0.125	0.113	0.115	90.6	91.6	74.0-123			1.10	20
trans-1,2-Dichloroethene	0.125	0.114	0.121	90.9	97.0	72.0-122			6.49	20
1,2-Dichloropropane	0.125	0.121	0.116	97.0	93.0	75.0-126			4.26	20
1,1-Dichloropropene	0.125	0.123	0.119	98.3	95.5	72.0-130			2.96	20
1,3-Dichloropropane	0.125	0.114	0.114	91.3	91.3	80.0-121			0.0526	20
cis-1,3-Dichloropropene	0.125	0.109	0.107	86.9	85.6	80.0-125			1.41	20
trans-1,3-Dichloropropene	0.125	0.113	0.109	90.5	87.5	75.0-129			3.33	20
2,2-Dichloropropane	0.125	0.141	0.140	113	112	60.0-129			0.702	20
Di-isopropyl ether	0.125	0.113	0.115	90.6	92.3	62.0-133			1.86	20
Ethylbenzene	0.125	0.116	0.116	92.7	92.9	77.0-120			0.246	20
Hexachloro-1,3-butadiene	0.125	0.127	0.129	101	103	68.0-128			1.48	20
Isopropylbenzene	0.125	0.114	0.112	91.0	89.4	75.0-120			1.71	20
p-Isopropyltoluene	0.125	0.120	0.119	96.3	95.2	74.0-125			1.21	20
2-Butanone (MEK)	0.625	0.726	0.718	116	115	37.0-159			1.17	21.3
Methylene Chloride	0.125	0.130	0.133	104	106	67.0-123			1.93	20
4-Methyl-2-pentanone (MIBK)	0.625	0.618	0.616	98.9	98.6	60.0-144			0.222	20
Methyl tert-butyl ether	0.125	0.132	0.135	106	108	66.0-125			2.21	20
Naphthalene	0.125	0.116	0.116	92.7	93.2	64.0-125			0.559	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3313015-1 05/24/18 21:15 • (LCSD) R3313015-2 05/24/18 21:49

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
n-Propylbenzene	0.125	0.116	0.112	92.5	89.5	78.0-120			3.24	20
Styrene	0.125	0.115	0.113	92.2	90.7	78.0-124			1.65	20
1,1,1,2-Tetrachloroethane	0.125	0.122	0.123	97.4	98.4	74.0-124			1.06	20
1,1,2,2-Tetrachloroethane	0.125	0.127	0.124	102	99.2	73.0-120			2.82	20
Tetrachloroethene	0.125	0.125	0.123	99.7	98.4	70.0-127			1.28	20
Toluene	0.125	0.113	0.111	90.1	88.7	70.0-120			1.61	20
1,1,2-Trichlorotrifluoroethane	0.125	0.134	0.132	107	106	64.0-135			1.19	20
1,2,3-Trichlorobenzene	0.125	0.104	0.104	83.3	83.6	68.0-126			0.331	20
1,2,4-Trichlorobenzene	0.125	0.123	0.121	98.4	96.4	70.0-127			2.06	20
1,1,1-Trichloroethane	0.125	0.133	0.135	107	108	69.0-125			1.18	20
1,1,2-Trichloroethane	0.125	0.114	0.117	91.3	93.5	78.0-120			2.38	20
Trichlorofluoromethane	0.125	0.126	0.126	101	101	59.0-136			0.173	20
1,2,3-Trichloropropane	0.125	0.114	0.118	91.2	94.8	73.0-124			3.87	20
1,2,3-Trimethylbenzene	0.125	0.120	0.116	95.8	93.1	76.0-120			2.91	20
1,2,4-Trimethylbenzene	0.125	0.115	0.114	91.9	91.4	75.0-120			0.464	20
1,3,5-Trimethylbenzene	0.125	0.120	0.117	95.8	93.8	75.0-120			2.12	20
Vinyl chloride	0.125	0.114	0.114	91.2	91.3	63.0-134			0.0728	20
Xylenes, Total	0.375	0.357	0.355	95.2	94.7	77.0-120			0.562	20
(S) Toluene-d8				*109*	*109*	*80.0-120*				
(S) Dibromofluoromethane				*115*	*118*	*74.0-131*				
(S) 4-Bromofluorobenzene				*110*	*110*	*64.0-132*				

L995482-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995482-04 05/25/18 04:06 • (MS) R3313015-4 05/25/18 06:55 • (MSD) R3313015-5 05/25/18 07:14

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.692	ND	0.473	0.380	68.3	54.9	1	10.0-160			21.7	36
Acrylonitrile	0.692	ND	0.805	0.777	116	112	1	14.0-160			3.56	33
Benzene	0.138	ND	0.162	0.159	117	115	1	13.0-146			1.69	27
Bromobenzene	0.138	ND	0.169	0.165	122	119	1	10.0-149			2.40	33
Bromodichloromethane	0.138	ND	0.180	0.173	130	125	1	15.0-142			3.88	28
Bromoform	0.138	ND	0.155	0.146	112	105	1	10.0-147			6.34	31
Bromomethane	0.138	ND	0.111	0.109	79.8	78.9	1	10.0-160			1.15	32
n-Butylbenzene	0.138	ND	0.187	0.171	135	124	1	10.0-154			8.64	37
sec-Butylbenzene	0.138	ND	0.175	0.168	127	121	1	10.0-151			4.37	36
tert-Butylbenzene	0.138	ND	0.179	0.172	129	124	1	10.0-152			3.99	35
Carbon tetrachloride	0.138	ND	0.195	0.188	141	136	1	13.0-140	J5		3.59	30
Chlorobenzene	0.138	ND	0.167	0.161	121	117	1	10.0-149			3.71	31

L995482-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995482-04 05/25/18 04:06 • (MS) R3313015-4 05/25/18 06:55 • (MSD) R3313015-5 05/25/18 07:14

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chlorodibromomethane	0.138	ND	0.166	0.158	120	114	1	12.0-147			4.69	29
Chloroethane	0.138	ND	0.123	0.131	89.2	94.8	1	10.0-159			6.12	33
Chloroform	0.138	ND	0.164	0.156	118	113	1	18.0-148			4.80	28
Chloromethane	0.138	ND	0.183	0.186	132	134	1	10.0-146			1.82	29
2-Chlorotoluene	0.138	ND	0.169	0.164	122	119	1	10.0-151			2.49	35
4-Chlorotoluene	0.138	ND	0.170	0.167	123	121	1	10.0-150			1.98	35
1,2-Dibromo-3-Chloropropane	0.138	ND	0.140	0.132	101	95.5	1	10.0-149			5.94	34
1,2-Dibromoethane	0.138	ND	0.162	0.161	117	116	1	14.0-145			0.590	28
Dibromomethane	0.138	ND	0.173	0.163	125	118	1	18.0-144			5.86	27
1,2-Dichlorobenzene	0.138	ND	0.164	0.158	118	114	1	10.0-153			3.47	34
1,3-Dichlorobenzene	0.138	ND	0.170	0.162	123	117	1	10.0-150			4.86	35
1,4-Dichlorobenzene	0.138	ND	0.158	0.153	114	111	1	10.0-148			2.89	34
Dichlorodifluoromethane	0.138	ND	0.279	0.265	202	191	1	10.0-162	J5	J5	5.23	30
1,1-Dichloroethane	0.138	ND	0.162	0.157	117	113	1	19.0-148			3.33	28
1,2-Dichloroethane	0.138	ND	0.171	0.164	123	118	1	17.0-147			4.32	27
1,1-Dichloroethene	0.138	ND	0.185	0.182	134	131	1	10.0-150			1.92	31
cis-1,2-Dichloroethene	0.138	ND	0.154	0.141	112	102	1	16.0-145			9.37	28
trans-1,2-Dichloroethene	0.138	ND	0.161	0.154	117	111	1	11.0-142			5.01	29
1,2-Dichloropropane	0.138	ND	0.166	0.158	120	114	1	17.0-148			5.10	28
1,1-Dichloropropene	0.138	ND	0.170	0.165	123	119	1	10.0-150			3.05	30
1,3-Dichloropropane	0.138	ND	0.168	0.162	121	117	1	16.0-148			3.77	27
cis-1,3-Dichloropropene	0.138	ND	0.156	0.154	113	111	1	13.0-150			1.61	28
trans-1,3-Dichloropropene	0.138	ND	0.166	0.158	120	114	1	10.0-152			4.77	29
2,2-Dichloropropane	0.138	ND	0.166	0.159	120	115	1	16.0-143			4.27	30
Di-isopropyl ether	0.138	ND	0.146	0.138	105	99.5	1	16.0-149			5.64	28
Ethylbenzene	0.138	ND	0.174	0.164	126	119	1	10.0-147			5.87	31
Hexachloro-1,3-butadiene	0.138	ND	0.181	0.163	131	118	1	10.0-154			10.5	40
Isopropylbenzene	0.138	ND	0.167	0.163	120	118	1	10.0-147			2.34	33
p-Isopropyltoluene	0.138	ND	0.169	0.161	122	116	1	10.0-156			4.55	37
2-Butanone (MEK)	0.692	ND	1.00	0.891	143	127	1	10.0-160			11.8	33
Methylene Chloride	0.138	ND	0.159	0.153	109	105	1	16.0-139			3.49	29
4-Methyl-2-pentanone (MIBK)	0.692	ND	0.710	0.680	103	98.3	1	12.0-160			4.32	32
Methyl tert-butyl ether	0.138	ND	0.166	0.149	120	108	1	21.0-145			10.6	29
Naphthalene	0.138	ND	0.165	0.157	119	114	1	10.0-153			4.84	36
n-Propylbenzene	0.138	ND	0.165	0.158	120	114	1	10.0-151			4.56	34
Styrene	0.138	ND	0.174	0.174	126	125	1	10.0-155			0.157	34
1,1,1,2-Tetrachloroethane	0.138	ND	0.170	0.163	123	118	1	10.0-147			3.83	30
1,1,2,2-Tetrachloroethane	0.138	ND	0.147	0.135	106	97.2	1	10.0-155			8.59	31
Tetrachloroethene	0.138	ND	0.189	0.177	136	127	1	10.0-144			6.32	32

L995482-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995482-04 05/25/18 04:06 • (MS) R3313015-4 05/25/18 06:55 • (MSD) R3313015-5 05/25/18 07:14

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Toluene	0.138	ND	0.162	0.157	117	114	1	10.0-144			2.87	28
1,1,2-Trichlorotrifluoroethane	0.138	ND	0.175	0.169	127	122	1	10.0-153			3.75	33
1,2,3-Trichlorobenzene	0.138	ND	0.151	0.159	109	115	1	10.0-153			4.72	40
1,2,4-Trichlorobenzene	0.138	ND	0.168	0.174	122	125	1	10.0-156			3.04	40
1,1,1-Trichloroethane	0.138	ND	0.179	0.177	130	128	1	18.0-145			1.55	29
1,1,2-Trichloroethane	0.138	ND	0.166	0.161	120	117	1	12.0-151			2.60	28
Trichlorofluoromethane	0.138	ND	0.201	0.205	145	148	1	10.0-157			2.22	34
1,2,3-Trichloropropane	0.138	ND	0.142	0.140	102	101	1	10.0-154			1.10	32
1,2,3-Trimethylbenzene	0.138	ND	0.165	0.158	119	114	1	10.0-150			4.09	33
1,2,4-Trimethylbenzene	0.138	ND	0.181	0.166	130	120	1	10.0-151			8.36	34
1,3,5-Trimethylbenzene	0.138	ND	0.172	0.162	124	117	1	10.0-150			5.63	33
Vinyl chloride	0.138	ND	0.175	0.176	127	127	1	10.0-150			0.470	29
Xylenes, Total	0.415	ND	0.516	0.489	124	118	1	10.0-150			5.29	31
(S) Toluene-d8					*111*	*111*		*80.0-120*				
(S) Dibromofluoromethane					*108*	*107*		*74.0-131*				
(S) 4-Bromofluorobenzene					*112*	*115*		*64.0-132*				

Method Blank (MB)

(MB) R3313558-3 05/29/18 10:29

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Trichloroethene	U		0.000400	0.00100
(S) Toluene-d8	*115*			*80.0-120*
(S) Dibromofluoromethane	*93.6*			*74.0-131*
(S) 4-Bromofluorobenzene	*91.5*			*64.0-132*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3313558-1 05/29/18 08:38 • (LCSD) R3313558-2 05/29/18 08:57

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Trichloroethene	0.125	0.128	0.139	102	111	79.0-120			8.14	20
(S) Toluene-d8				*112*	*111*	*80.0-120*				
(S) Dibromofluoromethane				*110*	*112*	*74.0-131*				
(S) 4-Bromofluorobenzene				*116*	*113*	*64.0-132*				

Method Blank (MB)

(MB) R3313509-2 05/26/18 10:40

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acetone	U		0.0137	0.0250
Acrylonitrile	U		0.00190	0.0125
Benzene	U		0.000400	0.00100
Bromobenzene	U		0.00105	0.0125
Bromodichloromethane	U		0.000788	0.00250
Bromoform	U		0.00598	0.0250
Bromomethane	U		0.00370	0.0125
n-Butylbenzene	U		0.00384	0.0125
sec-Butylbenzene	U		0.00253	0.0125
tert-Butylbenzene	U		0.00155	0.00500
Carbon tetrachloride	U		0.00108	0.00500
Chlorobenzene	U		0.000573	0.00250
Chlorodibromomethane	U		0.000450	0.00250
Chloroethane	U		0.00108	0.00500
Chloroform	U		0.000415	0.00250
Chloromethane	U		0.00139	0.0125
2-Chlorotoluene	U		0.000920	0.00250
4-Chlorotoluene	U		0.00113	0.00500
1,2-Dibromo-3-Chloropropane	U		0.00510	0.0250
1,2-Dibromoethane	U		0.000525	0.00250
Dibromomethane	U		0.00100	0.00500
1,2-Dichlorobenzene	U		0.00145	0.00500
1,3-Dichlorobenzene	U		0.00170	0.00500
1,4-Dichlorobenzene	U		0.00197	0.00500
Dichlorodifluoromethane	U		0.000818	0.00250
1,1-Dichloroethane	U		0.000575	0.00250
1,2-Dichloroethane	U		0.000475	0.00250
1,1-Dichloroethene	U		0.000500	0.00250
cis-1,2-Dichloroethene	U		0.000690	0.00250
trans-1,2-Dichloroethene	U		0.00143	0.00500
1,2-Dichloropropane	U		0.00127	0.00500
1,1-Dichloropropene	U		0.000700	0.00250
1,3-Dichloropropane	U		0.00175	0.00500
cis-1,3-Dichloropropene	U		0.000678	0.00250
trans-1,3-Dichloropropene	U		0.00153	0.00500
2,2-Dichloropropane	U		0.000793	0.00250
Di-isopropyl ether	U		0.000350	0.00100
Ethylbenzene	U		0.000530	0.00250
Hexachloro-1,3-butadiene	U		0.0127	0.0250
Isopropylbenzene	U		0.000863	0.00250

Method Blank (MB)

(MB) R3313509-2 05/26/18 10:40

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
p-Isopropyltoluene	U		0.00233	0.00500
2-Butanone (MEK)	U		0.0125	0.0250
Methylene Chloride	U		0.00664	0.0250
4-Methyl-2-pentanone (MIBK)	U		0.0100	0.0250
Methyl tert-butyl ether	U		0.000295	0.00100
Naphthalene	U		0.00312	0.0125
n-Propylbenzene	U		0.00118	0.00500
Styrene	U		0.00273	0.0125
1,1,1,2-Tetrachloroethane	U		0.000500	0.00250
1,1,2,2-Tetrachloroethane	U		0.000390	0.00250
Tetrachloroethene	U		0.000700	0.00250
Toluene	U		0.00125	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000675	0.00250
1,2,3-Trichlorobenzene	U		0.000625	0.00250
1,2,4-Trichlorobenzene	U		0.00482	0.0125
1,1,1-Trichloroethane	U		0.000275	0.00250
1,1,2-Trichloroethane	U		0.000883	0.00250
Trichloroethene	U		0.000400	0.00100
Trichlorofluoromethane	U		0.000500	0.00250
1,2,3-Trichloropropane	U		0.00510	0.0125
1,2,3-Trimethylbenzene	U		0.00115	0.00500
1,2,4-Trimethylbenzene	U		0.00116	0.00500
1,3,5-Trimethylbenzene	U		0.00108	0.00500
Vinyl chloride	U		0.000683	0.00250
Xylenes, Total	U		0.00478	0.00650
(S) Toluene-d8	*113*			*80.0-120*
(S) Dibromofluoromethane	*89.1*			*74.0-131*
(S) 4-Bromofluorobenzene	*113*			*64.0-132*

Laboratory Control Sample (LCS)

(LCS) R3313509-1 05/26/18 09:38

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	0.625	0.752	120	11.0-160	
Acrylonitrile	0.625	0.678	109	61.0-143	
Benzene	0.125	0.122	98.0	71.0-124	
Bromobenzene	0.125	0.138	110	78.0-120	
Bromodichloromethane	0.125	0.127	102	75.0-120	

Laboratory Control Sample (LCS)

(LCS) R3313509-1 05/26/18 09:38

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Bromoform	0.125	0.120	95.9	65.0-133	
Bromomethane	0.125	0.114	90.9	26.0-160	
n-Butylbenzene	0.125	0.139	111	73.0-126	
sec-Butylbenzene	0.125	0.132	106	75.0-121	
tert-Butylbenzene	0.125	0.137	110	74.0-122	
Carbon tetrachloride	0.125	0.145	116	66.0-123	
Chlorobenzene	0.125	0.124	99.1	79.0-121	
Chlorodibromomethane	0.125	0.112	89.6	74.0-128	
Chloroethane	0.125	0.122	97.6	51.0-147	
Chloroform	0.125	0.129	103	73.0-123	
Chloromethane	0.125	0.116	92.6	51.0-138	
2-Chlorotoluene	0.125	0.123	98.0	72.0-124	
4-Chlorotoluene	0.125	0.124	98.8	78.0-120	
1,2-Dibromo-3-Chloropropane	0.125	0.122	97.8	65.0-126	
1,2-Dibromoethane	0.125	0.127	102	78.0-122	
Dibromomethane	0.125	0.122	97.6	79.0-120	
1,2-Dichlorobenzene	0.125	0.116	92.7	80.0-120	
1,3-Dichlorobenzene	0.125	0.127	101	72.0-123	
1,4-Dichlorobenzene	0.125	0.125	100	77.0-120	
Dichlorodifluoromethane	0.125	0.143	114	49.0-155	
1,1-Dichloroethane	0.125	0.142	114	70.0-128	
1,2-Dichloroethane	0.125	0.170	136	69.0-128	J4
1,1-Dichloroethene	0.125	0.147	118	63.0-131	
cis-1,2-Dichloroethene	0.125	0.124	98.9	74.0-123	
trans-1,2-Dichloroethene	0.125	0.119	95.3	72.0-122	
1,2-Dichloropropane	0.125	0.141	113	75.0-126	
1,1-Dichloropropene	0.125	0.134	107	72.0-130	
1,3-Dichloropropane	0.125	0.133	106	80.0-121	
cis-1,3-Dichloropropene	0.125	0.125	99.7	80.0-125	
trans-1,3-Dichloropropene	0.125	0.122	97.4	75.0-129	
2,2-Dichloropropane	0.125	0.135	108	60.0-129	
Di-isopropyl ether	0.125	0.138	111	62.0-133	
Ethylbenzene	0.125	0.140	112	77.0-120	
Hexachloro-1,3-butadiene	0.125	0.145	116	68.0-128	
Isopropylbenzene	0.125	0.134	107	75.0-120	
p-Isopropyltoluene	0.125	0.136	109	74.0-125	
2-Butanone (MEK)	0.625	0.573	91.6	37.0-159	
Methylene Chloride	0.125	0.118	94.4	67.0-123	
4-Methyl-2-pentanone (MIBK)	0.625	0.804	129	60.0-144	
Methyl tert-butyl ether	0.125	0.121	96.6	66.0-125	

Laboratory Control Sample (LCS)

(LCS) R3313509-1 05/26/18 09:38

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Naphthalene	0.125	0.114	91.3	64.0-125	
n-Propylbenzene	0.125	0.138	111	78.0-120	
Styrene	0.125	0.123	98.1	78.0-124	
1,1,1,2-Tetrachloroethane	0.125	0.117	94.0	74.0-124	
1,1,2,2-Tetrachloroethane	0.125	0.129	103	73.0-120	
Tetrachloroethene	0.125	0.135	108	70.0-127	
Toluene	0.125	0.135	108	70.0-120	
1,1,2-Trichlorotrifluoroethane	0.125	0.117	94.0	64.0-135	
1,2,3-Trichlorobenzene	0.125	0.119	95.0	68.0-126	
1,2,4-Trichlorobenzene	0.125	0.125	100	70.0-127	
1,1,1-Trichloroethane	0.125	0.143	114	69.0-125	
1,1,2-Trichloroethane	0.125	0.142	114	78.0-120	
Trichloroethene	0.125	0.128	103	79.0-120	
Trichlorofluoromethane	0.125	0.148	119	59.0-136	
1,2,3-Trichloropropane	0.125	0.138	111	73.0-124	
1,2,3-Trimethylbenzene	0.125	0.135	108	76.0-120	
1,2,4-Trimethylbenzene	0.125	0.133	107	75.0-120	
1,3,5-Trimethylbenzene	0.125	0.135	108	75.0-120	
Vinyl chloride	0.125	0.132	106	63.0-134	
Xylenes, Total	0.375	0.380	101	77.0-120	
(S) Toluene-d8			*109*	*80.0-120*	
(S) Dibromofluoromethane			*86.4*	*74.0-131*	
(S) 4-Bromofluorobenzene			*113*	*64.0-132*	

L996521-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L996521-06 05/26/18 17:24 • (MS) R3313509-3 05/26/18 18:26 • (MSD) R3313509-4 05/26/18 18:47

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.711	ND	0.906	0.391	127	55.0	1	10.0-160		J3	79.3	36
Acrylonitrile	0.711	ND	0.936	0.607	132	85.3	1	14.0-160		J3	42.7	33
Benzene	0.142	ND	0.0727	0.118	51.1	82.9	1	13.0-146		J3	47.4	27
Bromobenzene	0.142	ND	0.126	0.153	88.8	108	1	10.0-149			19.3	33
Bromodichloromethane	0.142	ND	0.102	0.135	72.0	95.1	1	15.0-142			27.7	28
Bromoform	0.142	ND	0.140	0.115	98.7	80.9	1	10.0-147			19.9	31
Bromomethane	0.142	ND	0.0540	0.0959	38.0	67.4	1	10.0-160		J3	55.9	32
n-Butylbenzene	0.142	ND	0.0984	0.158	69.2	111	1	10.0-154		J3	46.5	37
sec-Butylbenzene	0.142	ND	0.0887	0.154	62.4	108	1	10.0-151		J3	53.5	36
tert-Butylbenzene	0.142	ND	0.0846	0.158	59.5	111	1	10.0-152		J3	60.4	35

L996521-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L996521-06 05/26/18 17:24 • (MS) R3313509-3 05/26/18 18:26 • (MSD) R3313509-4 05/26/18 18:47

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Carbon tetrachloride	0.142	ND	0.0574	0.130	40.4	91.1	1	13.0-140		J3	77.2	30
Chlorobenzene	0.142	ND	0.0927	0.129	65.2	91.0	1	10.0-149		J3	33.1	31
Chlorodibromomethane	0.142	ND	0.114	0.109	80.3	76.6	1	12.0-147			4.67	29
Chloroethane	0.142	ND	0.0456	0.0985	32.1	69.3	1	10.0-159		J3	73.4	33
Chloroform	0.142	ND	0.0930	0.130	65.4	91.4	1	18.0-148		J3	33.2	28
Chloromethane	0.142	ND	0.0475	0.0855	33.4	60.1	1	10.0-146		J3	57.2	29
2-Chlorotoluene	0.142	ND	0.0916	0.133	64.4	93.2	1	10.0-151		J3	36.5	35
4-Chlorotoluene	0.142	ND	0.126	0.145	88.7	102	1	10.0-150			14.0	35
1,2-Dibromo-3-Chloropropane	0.142	ND	0.156	0.108	110	75.8	1	10.0-149		J3	36.7	34
1,2-Dibromoethane	0.142	ND	0.144	0.130	101	91.4	1	14.0-145			10.3	28
Dibromomethane	0.142	ND	0.131	0.124	91.8	86.9	1	18.0-144			5.52	27
1,2-Dichlorobenzene	0.142	ND	0.116	0.133	81.3	93.8	1	10.0-153			14.3	34
1,3-Dichlorobenzene	0.142	ND	0.112	0.131	78.4	92.0	1	10.0-150			15.9	35
1,4-Dichlorobenzene	0.142	ND	0.109	0.132	76.9	92.6	1	10.0-148			18.6	34
Dichlorodifluoromethane	0.142	ND	0.0306	0.0836	21.5	58.8	1	10.0-162		J3	92.9	30
1,1-Dichloroethane	0.142	ND	0.0848	0.139	59.7	97.6	1	19.0-148		J3	48.3	28
1,2-Dichloroethane	0.142	ND	0.138	0.154	97.0	108	1	17.0-147			10.9	27
1,1-Dichloroethene	0.142	ND	0.0600	0.129	42.2	90.7	1	10.0-150		J3	73.0	31
cis-1,2-Dichloroethene	0.142	ND	0.0824	0.108	57.9	75.9	1	16.0-145			26.8	28
trans-1,2-Dichloroethene	0.142	ND	0.0541	0.102	38.1	71.6	1	11.0-142		J3	61.2	29
1,2-Dichloropropane	0.142	ND	0.108	0.145	76.0	102	1	17.0-148		J3	29.4	28
1,1-Dichloropropene	0.142	ND	0.0624	0.128	43.9	90.0	1	10.0-150		J3	68.8	30
1,3-Dichloropropane	0.142	ND	0.148	0.154	104	108	1	16.0-148			4.19	27
cis-1,3-Dichloropropene	0.142	0.0163	0.122	0.138	74.5	85.3	1	13.0-150			11.8	28
trans-1,3-Dichloropropene	0.142	ND	0.117	0.132	82.0	92.5	1	10.0-152			12.0	29
2,2-Dichloropropane	0.142	ND	0.0692	0.137	48.7	96.3	1	16.0-143		J3	65.7	30
Di-isopropyl ether	0.142	ND	0.118	0.147	82.9	103	1	16.0-149			21.8	28
Ethylbenzene	0.142	ND	0.0880	0.150	61.8	106	1	10.0-147		J3	52.4	31
Hexachloro-1,3-butadiene	0.142	ND	0.108	0.164	76.2	115	1	10.0-154		J3	40.6	40
Isopropylbenzene	0.142	ND	0.0879	0.151	61.8	106	1	10.0-147		J3	52.9	33
p-Isopropyltoluene	0.142	ND	0.00407	0.146	2.86	102	1	10.0-156	J6	J3	189	37
2-Butanone (MEK)	0.711	ND	0.689	0.447	96.8	62.9	1	10.0-160		J3	42.6	33
Methylene Chloride	0.142	ND	0.0824	0.117	58.0	82.1	1	16.0-139		J3	34.5	29
4-Methyl-2-pentanone (MIBK)	0.711	ND	0.974	0.768	137	108	1	12.0-160			23.6	32
Methyl tert-butyl ether	0.142	ND	0.128	0.124	89.8	87.1	1	21.0-145			3.08	29
Naphthalene	0.142	ND	0.153	0.134	107	94.0	1	10.0-153			13.2	36
n-Propylbenzene	0.142	ND	0.0903	0.150	63.5	106	1	10.0-151		J3	49.8	34
Styrene	0.142	ND	0.102	0.136	72.0	95.8	1	10.0-155			28.3	34
1,1,1,2-Tetrachloroethane	0.142	ND	0.101	0.114	70.8	80.5	1	10.0-147			12.8	30

L996521-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L996521-06 05/26/18 17:24 • (MS) R3313509-3 05/26/18 18:26 • (MSD) R3313509-4 05/26/18 18:47

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
1,1,2,2-Tetrachloroethane	0.142	ND	0.165	0.153	116	108	1	10.0-155			7.25	31
Tetrachloroethene	0.142	ND	0.0874	0.147	61.5	103	1	10.0-144		J3	50.6	32
Toluene	0.142	ND	0.0891	0.138	61.7	96.1	1	10.0-144		J3	43.1	28
1,1,2-Trichlorotrifluoroethane	0.142	ND	0.0449	0.110	31.5	77.4	1	10.0-153		J3	84.2	33
1,2,3-Trichlorobenzene	0.142	ND	0.131	0.128	91.8	90.1	1	10.0-153			1.87	40
1,2,4-Trichlorobenzene	0.142	ND	0.125	0.129	87.7	90.6	1	10.0-156			3.27	40
1,1,1-Trichloroethane	0.142	ND	0.0684	0.145	48.1	102	1	18.0-145		J3	71.5	29
1,1,2-Trichloroethane	0.142	ND	0.164	0.134	116	94.0	1	12.0-151			20.7	28
Trichloroethene	0.142	ND	0.0755	0.122	53.1	85.8	1	11.0-148		J3	47.1	29
Trichlorofluoromethane	0.142	ND	0.0614	0.131	43.2	92.0	1	10.0-157		J3	72.2	34
1,2,3-Trichloropropane	0.142	ND	0.175	0.142	123	99.9	1	10.0-154			20.9	32
1,2,3-Trimethylbenzene	0.142	ND	0.127	0.154	89.3	108	1	10.0-150			19.0	33
1,2,4-Trimethylbenzene	0.142	ND	0.114	0.159	79.4	111	1	10.0-151			32.5	34
1,3,5-Trimethylbenzene	0.142	ND	0.0928	0.151	65.2	106	1	10.0-150		J3	47.8	33
Vinyl chloride	0.142	ND	0.0336	0.0971	23.6	68.3	1	10.0-150		J3	97.1	29
Xylenes, Total	0.427	ND	0.255	0.403	59.8	94.4	1	10.0-150		J3	44.9	31
(S) Toluene-d8					*109*	*108*		*80.0-120*				
(S) Dibromofluoromethane					*96.3*	*92.6*		*74.0-131*				
(S) 4-Bromofluorobenzene					*119*	*117*		*64.0-132*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MDL (dry)	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
T8	Sample(s) received past/too close to holding time expiration.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

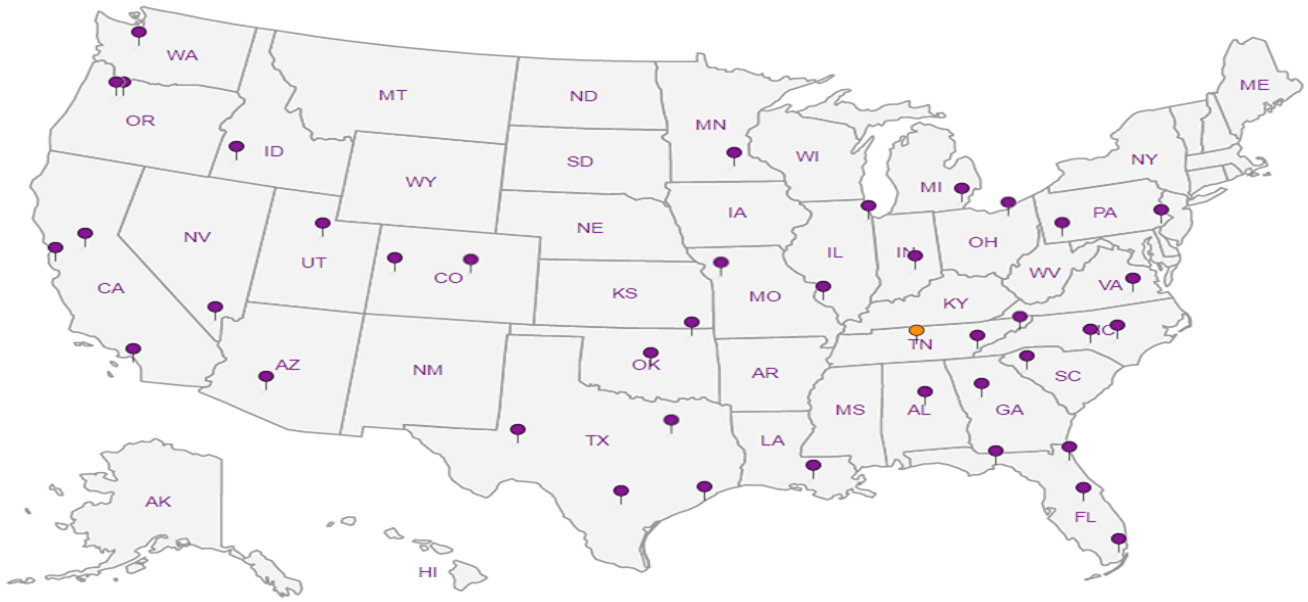
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. ESC Lab Sciences performs all testing at our central laboratory.



Company Name/Address:	Billing Information:
Terracon 6949 South High Tech Drive Midvale, Utah 84047	TERRDUT

Report to:	Email To:
David Jamison	David.Jamison@Terracon.com

Project Description:	City/State Collected:
Schovaers Electronics Salt Lake County Brownfields	Salt Lake City UT

Phone: / Fax:	Client Project #	Lab Project #
	61177082	

Collected by (print):	Site/Facility ID #	P.O. #
David Jamison		

Collected by (signature):

Immediately Packed on Ice N ___ Y ✔

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed: 5 Day TAT (Terracon)

Email? ___No ✔Yes
FAX? ✔No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 995461
E018
Acctnum: TERRDUT
Template:
Prelogin:
TSR: Dephne R.
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Soil VOC's SW-846 8260B	GW VOC's SW-846 8260B	Soil 13 PP metals 6010	GW 13 PP metals 6010	Soil Hex chrome	GW Hex chrome	Soil pH SW-846 9045D preserved	Hold			Rem./Contaminant	Sample # (lab only)
SE-SB-21 (3)	Grab	S	3	5-17-18	9:00	3	X		X		X		X					01
SE-SB-21 (7)	Grab	S	7		9:08	3	X		X		X		X					02
SE-SB-21	Grab	GW	—		9:30	5		X		X		X						03
SE-SB-22 (3)	Grab	S	3		9:50	3	X		X		X		X					04
SE-SB-22 (8)	Grab	S	8		9:58	3	X		X		X		X					05
SE-SB-22	Grab	GW	—		10:10	5		X		X		X						06
SE-SB-24 (3)	Grab	S	3		10:40	3	X		X		X		X					07
SE-SB-24 (7)	Grab	S	~~37~~ 7		10:48	3	X		X		X		X					08
SE-SB-23 (3)	Grab	S	3		11:20	3	X		X		X		X					09
SE-SB-23 (10)	Grab	S	10		11:29	3	X		X		X		X					10

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other_____

pH _____ Temp _____

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____	Condition: (lab use only)
	5-18-18	14:39			
Relinquished by : (Signature) ESCSLWT	Date: 5/18/18	Time: 1700	Received by: (Signature)	Temp: 4.9°C Bottles Received: 9	COC Seal Intact: ___Y ___N ___NA
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) SG	Date: 5/19/18 Time: 9:45	pH Checked: NCF: X

Company Name/Address:
Terracon
6949 South High Tech Drive
Midvale, Utah
84047

Billing Information:
TERRDUT

Report to: David Jamison

Email To: David.Jamison@Terracon.com

Project Description: Schovaers Electronics Salt Lake County Brownfields

City/State Collected: Salt Lake City UT

Phone:
Fax:

Client Project # 61177082

Lab Project #

Collected by (print): David Jamison

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed
5 Day TAT (Terracon)

Email? ___No ✓Yes
FAX? ✓No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

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YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 995461

Table #

Acctnum: TERRDUT

Template:

Prelogin:

TSR: Daphne R.

PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Soil VOC's SW-846 8260B	GW VOC's SW-846 8260B	Soil 13 PP metals 6010	GW 13 PP metals 6010	Soil Hex chrome	GW Hex chrome	Soil pH SW-846 9045D Preserved	Hold			Rem./Contaminant	Sample # (lab only)
SE-SB-23	Grab	GW	—	5-17-18	11:40	5		X		X		X						11
SE-SB-20 (3)	Grab	S	3		11:50	3	X		X		X		X					12
SE-SB-20 (11)	Grab	S	11		11:58	3	X		X		X		X					13
SESB-20	Grab	GW	—		12:15	5		X		X		X						14
SE-SB-19 (4)	Grab	S	4		12:27	3	X		X		X		X					15
SE-SB-19 (8)	Grab	S	8		12:35	3	X		X		X		X					16
SE-SB-19	Grab	GW	—		12:43	5		X		X		X						17
SE-SB-18 (3)	Grab	S	3		12:58	3	X		X		X		X					18
SE-SB-18 (8)	Grab	S	8		13:05	3	X		X		X		X					19
SE-SB-18	Grab	GW	—		13:20	5		X		X		X						20

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other_____

pH _____ Temp _____

5-132

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____	Condition: (lab use only)
Relinquished by : (Signature) ESCSLC04	Date: 5/18/18	Time: 1700	Received by: (Signature)	Temp: 4.9 °C Bottles Received: 94	COC Seal Intact: ___Y ___N ___NA
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 5/19/18 Time: 08:45	pH Checked: NCF: X

Chain of Custody Page 1 of 1

ESC LAB SCIENCES

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Company Name/Address: Terracon, 6949 South High Tech Drive, Midvale, Utah 84047	Billing Information: TERRDUT
Report to: David Jamison	Email To: David.Jamison@Terracon.com
Project Description: Schowers Electronics Salt Lake County Brownfields	City/State Collected: Salt Lake City UT
Phone: Fax:	Client Project # 6117082
Collected by (print): David Jamison	Site/Facility ID #
Collected by (signature): Immediately Packed on ice N ___ Y ✓	Rush? (Lab MUST Be Notified): ___ Same Day 200%, ___ Next Day 100%, ___ Two Day 50%, ___ Three Day 25%
	Date Results Needed: 5 Day TAT (Terracon)
	Email? ___ No ✓ Yes; FAX? ✓ No ___ Yes
Lab Project #	P.O. #

L# 995461
Table #
Acctnum: TERRDUT
Template:
Prelogin:
TSR: Dayna R.
PB:
Shipped Via:

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Soil VOC's SW-846 8260B	GW VOC's SW-846 8260B	Soil 13 PP Metals 6010	GW 13 PP Metals 6010	Soil Hex chrome	GW Hex chrome	Soil pH SW-846 9045D Preserved	Hold	Rem./Contaminant	Sample # (lab only)
SE-SB-16 (2.5)	Grab	S	2.5	5-17-18	13:40	1					X					21
SE-SB-16 (5)	Grab	S	5	5-17-18	13:42	1					X			X		22
SE-SB-16 (7.5)	Grab	S	7.5	5-17-18	13:46	1								X		
SE-SB-16 (10)	Grab	S	10	5-17-18	13:50	1								X		
SE-SB-17 (2.5)	Grab	S	2.5	5-17-18	14:19	1					X					23
SE-SB-17 (5)	Grab	S	5	5-17-18	14:22	1					X					24
SE-SB-17 (7.5)	Grab	S	7.5	5-17-18	14:27	1								X		
SE-SB-17 (10)	Grab	S	10	5-17-18	14:30	1								X		
SE-SB-17	Grab	GW	—	5-17-18	14:50	5		X		X		X				25
SE-SB-32	Grab	GW	—	5-17-18	15:10	5		X		X		X				-27

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

pH ___ Temp ___

Relinquished by: (Signature)	Date: 5-18-18	Time: 14:39	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ___	Condition: (lab use only)
Relinquished by: (Signature) ESCSLC01	Date: 5/18/18	Time: 1706	Received by: (Signature)	Temp: 4.9 °C Bottles Received: 94	COC Seal Intact: ___ Y ___ N ___ NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) ESCL	Date: 5/19/18 Time: 8:45	pH Checked: NCF: X

Company Name/Address:
Terracon
6949 South High Tech Drive
Midvale, Utah
84047

Billing Information:
TERRDUT

Report to: David Jamison

Email To: David.Jamison@Terracon.com

Project Description: Schowers Electronics Salt Lake County Brownfields

City/State Collected: Salt Lake City UT

Phone:
Fax:

Client Project # 61177082

Lab Project #

Collected by (print): David Jamison

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice: N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed: 5 Day TAT (Terracon)

Email? ___No ✓Yes
FAX? ✓No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

ESC LAB SCIENCES

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 995461

Table #

Acctnum: TERRDUT

Template:

Prelogin:

TSR: Daphne R.

PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Soil VOC's SW-846 8260B	GW VOC's SW-846 8260B	Soil 13 PP metals 6010	GW 13 PP metals 6010	Soil Hex chrome	GW Hex chrome	Soil pH SW-846 9045D Preserved	Hold			Rem./Contaminant	Sample # (lab only)
SE-SB-34 (7)	Grab	S	7	5-17-18	15:20	3	X		X		X		X					-28
SE-SB-27 (5)	Grab	S	5	5-17-18	15:30	3					X							-29
Trip Blank	Grab	W	–	Lab provided on 5-16-18		1		X										28

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other _____

pH _____ Temp _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ____	Condition: (lab use only)
Relinquished by: (Signature) ESCSLCUST	5/18/18	1700	Received by: (Signature)	Temp: 4.9 °C Bottles Received: 9	COC Seal Intact: ___Y ___N ___NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) 89	Date: 5/19/18 Time: 0745	pH Checked: NCF:

ESC LAB SCIENCES
Cooler Receipt Form

Client:	TERRA	SDG#	995461
Cooler Received/Opened On:	5/19/18	Temperature:	4.9
Received By:	Kevin Turner		
Signature:			

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?	✓		
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?		✓	
Preservation Correct / Checked?			

Matt Shacklock

ESC LAB SCIENCES

YOUR LAB OF CHOICE

Login #:995461	Client: TERRDUT	Date:5/19	Evaluated by:Kevin T

Non-Conformance (check applicable items)

	Sample Integrity		Chain of Custody Clarification		
	Parameter(s) past holding time	x	Login Clarification Needed		**If Broken Container:**
	Improper temperature		Chain of custody is incomplete		Insufficient packing material around container
	Improper container type		Please specify Metals requested.		Insufficient packing material inside cooler
	Improper preservation		Please specify TCLP requested.		Improper handling by carrier (FedEx / UPS / Courier
	Insufficient sample volume.		Received additional samples not listed on coc.		Sample was frozen
	Sample is biphasic.		Sample ids on containers do not match ids on coc		Container lid not intact
	Vials received with headspace.		Trip Blank not received.		**If no Chain of Custody:**
	Broken container		Client did not "X" analysis.		Received by:
	Broken container:		Chain of Custody is missing		Date/Time:
	Sufficient sample remains				Temp./Cont. Rec./pH:
					Carrier:
					Tracking#

Login Comments:

1. **Missing following IDs: SE-SB-27 (5), SE-SB-34 (7), SE-SB-32**
2. **Received following not on COC: SE-SB-22 DUP(1-250mlHDPE, 3-40mlHCL, 1-50ml Plunger), SE-SB-24 (7) (1-4oz, 1-2oz, 1-40ml METH soil vial), SE-SB-17 (5) DUP (1-4oz)**
3. **Metal waters are not preserved**

Client informed by:		Call		Email	X	Voice Mail		Date: 5/22/18	Time: 1103
TSR Initials: DR	Client Contact: DJ								

Login Instructions:

SE-SB-32 = SE-SB-22DUP. Go by sample id on CoC.
SE-SB-37(7) = SE-SB-24 (7)DUP. Go by sample id on CoC
SE-SB-27(5) = SE-SB-17 (5)DUP. Go by sample id on CoC

Run dissolved metals on waters. Filter in lab

ANALYTICAL REPORT

May 24, 2018

Terracon - Salt Lake City, UT

Sample Delivery Group:	L995391
Samples Received:	05/19/2018
Project Number:	61177082
Description:	Schovaers Electronics

Report To: David Jamison
6949 South High Tech Drive
Midvale, UT 84047

Entire Report Reviewed By:

Daphne R Richards

Daphne Richards
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

TABLE OF CONTENTS

SE-VP-3 L995391-01 Air

Collected by	Collected date/time	Received date/time
David Jamison	05/18/18 11:34	05/19/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG1114526	2	05/22/18 21:51	05/22/18 21:51	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG1115083	80	05/23/18 22:25	05/23/18 22:25	MBF

SE-VP-4 L995391-02 Air

Collected by	Collected date/time	Received date/time
David Jamison	05/18/18 11:55	05/19/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG1114526	2	05/22/18 22:34	05/22/18 22:34	MBF
Volatile Organic Compounds (MS) by Method TO-15	WG1115083	20	05/23/18 23:12	05/23/18 23:12	MBF

SE-VP-1 L995391-03 Air

Collected by	Collected date/time	Received date/time
David Jamison	05/18/18 12:18	05/19/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG1114526	2	05/22/18 23:17	05/22/18 23:17	MBF

SE-VP-2 L995391-04 Air

Collected by	Collected date/time	Received date/time
David Jamison	05/18/18 12:51	05/19/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (MS) by Method TO-15	WG1114526	2	05/23/18 00:00	05/23/18 00:00	MBF

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne R Richards

Daphne Richards
Technical Service Representative

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	2.50	5.94	98.0	233		2	WG1114526
Allyl chloride	107-05-1	76.53	0.400	1.25	ND	ND		2	WG1114526
Benzene	71-43-2	78.10	0.400	1.28	ND	ND		2	WG1114526
Benzyl Chloride	100-44-7	127	0.400	2.08	ND	ND		2	WG1114526
Bromodichloromethane	75-27-4	164	0.400	2.68	ND	ND		2	WG1114526
Bromoform	75-25-2	253	1.20	12.4	ND	ND		2	WG1114526
Bromomethane	74-83-9	94.90	0.400	1.55	ND	ND		2	WG1114526
1,3-Butadiene	106-99-0	54.10	4.00	8.85	ND	ND		2	WG1114526
Carbon disulfide	75-15-0	76.10	0.400	1.24	ND	ND		2	WG1114526
Carbon tetrachloride	56-23-5	154	0.400	2.52	ND	ND		2	WG1114526
Chlorobenzene	108-90-7	113	0.400	1.85	ND	ND		2	WG1114526
Chloroethane	75-00-3	64.50	0.400	1.06	ND	ND		2	WG1114526
Chloroform	67-66-3	119	0.400	1.95	ND	ND		2	WG1114526
Chloromethane	74-87-3	50.50	0.400	0.826	ND	ND		2	WG1114526
2-Chlorotoluene	95-49-8	126	0.400	2.06	ND	ND		2	WG1114526
Cyclohexane	110-82-7	84.20	0.400	1.38	ND	ND		2	WG1114526
Dibromochloromethane	124-48-1	208	0.400	3.40	ND	ND		2	WG1114526
1,2-Dibromoethane	106-93-4	188	0.400	3.08	ND	ND		2	WG1114526
1,2-Dichlorobenzene	95-50-1	147	0.400	2.40	ND	ND		2	WG1114526
1,3-Dichlorobenzene	541-73-1	147	0.400	2.40	ND	ND		2	WG1114526
1,4-Dichlorobenzene	106-46-7	147	0.400	2.40	ND	ND		2	WG1114526
1,2-Dichloroethane	107-06-2	99	0.400	1.62	ND	ND		2	WG1114526
1,1-Dichloroethane	75-34-3	98	0.400	1.60	ND	ND		2	WG1114526
1,1-Dichloroethene	75-35-4	96.90	0.400	1.59	ND	ND		2	WG1114526
cis-1,2-Dichloroethene	156-59-2	96.90	0.400	1.59	ND	ND		2	WG1114526
trans-1,2-Dichloroethene	156-60-5	96.90	0.400	1.59	ND	ND		2	WG1114526
1,2-Dichloropropane	78-87-5	113	0.400	1.85	ND	ND		2	WG1114526
cis-1,3-Dichloropropene	10061-01-5	111	0.400	1.82	ND	ND		2	WG1114526
trans-1,3-Dichloropropene	10061-02-6	111	0.400	1.82	ND	ND		2	WG1114526
1,4-Dioxane	123-91-1	88.10	0.400	1.44	1.76	6.34		2	WG1114526
Ethanol	64-17-5	46.10	1.26	2.38	28.1	52.9		2	WG1114526
Ethylbenzene	100-41-4	106	0.400	1.73	2.55	11.0		2	WG1114526
4-Ethyltoluene	622-96-8	120	0.400	1.96	2.98	14.6		2	WG1114526
Trichlorofluoromethane	75-69-4	137.40	0.400	2.25	ND	ND		2	WG1114526
Dichlorodifluoromethane	75-71-8	120.92	0.400	1.98	ND	ND		2	WG1114526
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.400	3.07	ND	ND		2	WG1114526
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.400	2.80	ND	ND		2	WG1114526
Heptane	142-82-5	100	0.400	1.64	0.438	1.79		2	WG1114526
Hexachloro-1,3-butadiene	87-68-3	261	1.26	13.5	ND	ND		2	WG1114526
n-Hexane	110-54-3	86.20	0.400	1.41	ND	ND		2	WG1114526
Isopropylbenzene	98-82-8	120.20	0.400	1.97	2.94	14.5		2	WG1114526
Methylene Chloride	75-09-2	84.90	0.400	1.39	2.02	7.01		2	WG1114526
Methyl Butyl Ketone	591-78-6	100	2.50	10.2	2.73	11.2		2	WG1114526
2-Butanone (MEK)	78-93-3	72.10	100	295	1760	5190		80	WG1115083
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	2.50	10.2	33.5	137		2	WG1114526
Methyl methacrylate	80-62-6	100.12	0.400	1.64	ND	ND		2	WG1114526
MTBE	1634-04-4	88.10	0.400	1.44	ND	ND		2	WG1114526
Naphthalene	91-20-3	128	1.26	6.60	4.65	24.4		2	WG1114526
2-Propanol	67-63-0	60.10	2.50	6.15	20.1	49.3		2	WG1114526
Propene	115-07-1	42.10	0.800	1.38	1.91	3.28		2	WG1114526
Styrene	100-42-5	104	0.400	1.70	ND	ND		2	WG1114526
1,1,2,2-Tetrachloroethane	79-34-5	168	0.400	2.75	ND	ND		2	WG1114526
Tetrachloroethylene	127-18-4	166	0.400	2.72	ND	ND		2	WG1114526
Tetrahydrofuran	109-99-9	72.10	0.400	1.18	3.97	11.7		2	WG1114526
Toluene	108-88-3	92.10	0.400	1.51	3.98	15.0		2	WG1114526
1,2,4-Trichlorobenzene	120-82-1	181	1.26	9.33	ND	ND		2	WG1114526

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.400	2.18	ND	ND		2	WG1114526
1,1,2-Trichloroethane	79-00-5	133	0.400	2.18	ND	ND		2	WG1114526
Trichloroethylene	79-01-6	131	16.0	85.7	569	3050		80	WG1115083
1,2,4-Trimethylbenzene	95-63-6	120	0.400	1.96	12.1	59.6		2	WG1114526
1,3,5-Trimethylbenzene	108-67-8	120	0.400	1.96	4.37	21.4		2	WG1114526
2,2,4-Trimethylpentane	540-84-1	114.22	0.400	1.87	ND	ND		2	WG1114526
Vinyl chloride	75-01-4	62.50	0.400	1.02	ND	ND		2	WG1114526
Vinyl Bromide	593-60-2	106.95	0.400	1.75	ND	ND		2	WG1114526
Vinyl acetate	108-05-4	86.10	0.400	1.41	ND	ND		2	WG1114526
m&p-Xylene	1330-20-7	106	0.800	3.47	22.2	96.3		2	WG1114526
o-Xylene	95-47-6	106	0.400	1.73	6.43	27.9		2	WG1114526
1,1-Difluoroethane	75-37-6	66.05	0.400	1.08	0.905	2.44		2	WG1114526
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*98.3*				WG1114526
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*96.6*				WG1115083

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	2.50	5.94	15.0	35.7		2	WG1114526
Allyl chloride	107-05-1	76.53	0.400	1.25	ND	ND		2	WG1114526
Benzene	71-43-2	78.10	0.400	1.28	ND	ND		2	WG1114526
Benzyl Chloride	100-44-7	127	0.400	2.08	ND	ND		2	WG1114526
Bromodichloromethane	75-27-4	164	0.400	2.68	ND	ND		2	WG1114526
Bromoform	75-25-2	253	1.20	12.4	ND	ND		2	WG1114526
Bromomethane	74-83-9	94.90	0.400	1.55	ND	ND		2	WG1114526
1,3-Butadiene	106-99-0	54.10	4.00	8.85	ND	ND		2	WG1114526
Carbon disulfide	75-15-0	76.10	0.400	1.24	ND	ND		2	WG1114526
Carbon tetrachloride	56-23-5	154	0.400	2.52	ND	ND		2	WG1114526
Chlorobenzene	108-90-7	113	0.400	1.85	ND	ND		2	WG1114526
Chloroethane	75-00-3	64.50	0.400	1.06	ND	ND		2	WG1114526
Chloroform	67-66-3	119	0.400	1.95	ND	ND		2	WG1114526
Chloromethane	74-87-3	50.50	0.400	0.826	ND	ND		2	WG1114526
2-Chlorotoluene	95-49-8	126	0.400	2.06	ND	ND		2	WG1114526
Cyclohexane	110-82-7	84.20	0.400	1.38	ND	ND		2	WG1114526
Dibromochloromethane	124-48-1	208	0.400	3.40	ND	ND		2	WG1114526
1,2-Dibromoethane	106-93-4	188	0.400	3.08	ND	ND		2	WG1114526
1,2-Dichlorobenzene	95-50-1	147	0.400	2.40	ND	ND		2	WG1114526
1,3-Dichlorobenzene	541-73-1	147	0.400	2.40	ND	ND		2	WG1114526
1,4-Dichlorobenzene	106-46-7	147	0.400	2.40	ND	ND		2	WG1114526
1,2-Dichloroethane	107-06-2	99	0.400	1.62	ND	ND		2	WG1114526
1,1-Dichloroethane	75-34-3	98	0.400	1.60	ND	ND		2	WG1114526
1,1-Dichloroethene	75-35-4	96.90	0.400	1.59	ND	ND		2	WG1114526
cis-1,2-Dichloroethene	156-59-2	96.90	0.400	1.59	ND	ND		2	WG1114526
trans-1,2-Dichloroethene	156-60-5	96.90	0.400	1.59	ND	ND		2	WG1114526
1,2-Dichloropropane	78-87-5	113	0.400	1.85	ND	ND		2	WG1114526
cis-1,3-Dichloropropene	10061-01-5	111	0.400	1.82	ND	ND		2	WG1114526
trans-1,3-Dichloropropene	10061-02-6	111	0.400	1.82	ND	ND		2	WG1114526
1,4-Dioxane	123-91-1	88.10	0.400	1.44	ND	ND		2	WG1114526
Ethanol	64-17-5	46.10	1.26	2.38	20.4	38.4		2	WG1114526
Ethylbenzene	100-41-4	106	0.400	1.73	ND	ND		2	WG1114526
4-Ethyltoluene	622-96-8	120	0.400	1.96	0.905	4.44		2	WG1114526
Trichlorofluoromethane	75-69-4	137.40	0.400	2.25	ND	ND		2	WG1114526
Dichlorodifluoromethane	75-71-8	120.92	0.400	1.98	0.400	1.98		2	WG1114526
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.400	3.07	ND	ND		2	WG1114526
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.400	2.80	ND	ND		2	WG1114526
Heptane	142-82-5	100	0.400	1.64	ND	ND		2	WG1114526
Hexachloro-1,3-butadiene	87-68-3	261	1.26	13.5	ND	ND		2	WG1114526
n-Hexane	110-54-3	86.20	0.400	1.41	ND	ND		2	WG1114526
Isopropylbenzene	98-82-8	120.20	0.400	1.97	ND	ND		2	WG1114526
Methylene Chloride	75-09-2	84.90	0.400	1.39	0.846	2.94		2	WG1114526
Methyl Butyl Ketone	591-78-6	100	2.50	10.2	ND	ND		2	WG1114526
2-Butanone (MEK)	78-93-3	72.10	2.50	7.37	7.04	20.8		2	WG1114526
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	2.50	10.2	ND	ND		2	WG1114526
Methyl methacrylate	80-62-6	100.12	0.400	1.64	ND	ND		2	WG1114526
MTBE	1634-04-4	88.10	0.400	1.44	ND	ND		2	WG1114526
Naphthalene	91-20-3	128	1.26	6.60	ND	ND		2	WG1114526
2-Propanol	67-63-0	60.10	2.50	6.15	14.8	36.5		2	WG1114526
Propene	115-07-1	42.10	0.800	1.38	ND	ND		2	WG1114526
Styrene	100-42-5	104	0.400	1.70	ND	ND		2	WG1114526
1,1,2,2-Tetrachloroethane	79-34-5	168	0.400	2.75	ND	ND		2	WG1114526
Tetrachloroethylene	127-18-4	166	0.400	2.72	ND	ND		2	WG1114526
Tetrahydrofuran	109-99-9	72.10	0.400	1.18	1.97	5.82		2	WG1114526
Toluene	108-88-3	92.10	0.400	1.51	0.724	2.73		2	WG1114526
1,2,4-Trichlorobenzene	120-82-1	181	1.26	9.33	ND	ND		2	WG1114526

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.400	2.18	0.652	3.55		2	WG1114526
1,1,2-Trichloroethane	79-00-5	133	0.400	2.18	ND	ND		2	WG1114526
Trichloroethylene	79-01-6	131	4.00	21.4	199	1070		20	WG1115083
1,2,4-Trimethylbenzene	95-63-6	120	0.400	1.96	1.35	6.62		2	WG1114526
1,3,5-Trimethylbenzene	108-67-8	120	0.400	1.96	0.478	2.35		2	WG1114526
2,2,4-Trimethylpentane	540-84-1	114.22	0.400	1.87	ND	ND		2	WG1114526
Vinyl chloride	75-01-4	62.50	0.400	1.02	ND	ND		2	WG1114526
Vinyl Bromide	593-60-2	106.95	0.400	1.75	ND	ND		2	WG1114526
Vinyl acetate	108-05-4	86.10	0.400	1.41	ND	ND		2	WG1114526
m&p-Xylene	1330-20-7	106	0.800	3.47	1.77	7.68		2	WG1114526
o-Xylene	95-47-6	106	0.400	1.73	0.669	2.90		2	WG1114526
1,1-Difluoroethane	75-37-6	66.05	0.400	1.08	0.785	2.12		2	WG1114526
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*97.6*				WG1114526
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*99.3*				WG1115083

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	2.50	5.94	131	312	E	2	WG1114526
Allyl chloride	107-05-1	76.53	0.400	1.25	ND	ND		2	WG1114526
Benzene	71-43-2	78.10	0.400	1.28	ND	ND		2	WG1114526
Benzyl Chloride	100-44-7	127	0.400	2.08	ND	ND		2	WG1114526
Bromodichloromethane	75-27-4	164	0.400	2.68	ND	ND		2	WG1114526
Bromoform	75-25-2	253	1.20	12.4	ND	ND		2	WG1114526
Bromomethane	74-83-9	94.90	0.400	1.55	ND	ND		2	WG1114526
1,3-Butadiene	106-99-0	54.10	4.00	8.85	ND	ND		2	WG1114526
Carbon disulfide	75-15-0	76.10	0.400	1.24	ND	ND		2	WG1114526
Carbon tetrachloride	56-23-5	154	0.400	2.52	ND	ND		2	WG1114526
Chlorobenzene	108-90-7	113	0.400	1.85	ND	ND		2	WG1114526
Chloroethane	75-00-3	64.50	0.400	1.06	ND	ND		2	WG1114526
Chloroform	67-66-3	119	0.400	1.95	ND	ND		2	WG1114526
Chloromethane	74-87-3	50.50	0.400	0.826	ND	ND		2	WG1114526
2-Chlorotoluene	95-49-8	126	0.400	2.06	ND	ND		2	WG1114526
Cyclohexane	110-82-7	84.20	0.400	1.38	ND	ND		2	WG1114526
Dibromochloromethane	124-48-1	208	0.400	3.40	ND	ND		2	WG1114526
1,2-Dibromoethane	106-93-4	188	0.400	3.08	ND	ND		2	WG1114526
1,2-Dichlorobenzene	95-50-1	147	0.400	2.40	ND	ND		2	WG1114526
1,3-Dichlorobenzene	541-73-1	147	0.400	2.40	ND	ND		2	WG1114526
1,4-Dichlorobenzene	106-46-7	147	0.400	2.40	ND	ND		2	WG1114526
1,2-Dichloroethane	107-06-2	99	0.400	1.62	ND	ND		2	WG1114526
1,1-Dichloroethane	75-34-3	98	0.400	1.60	ND	ND		2	WG1114526
1,1-Dichloroethene	75-35-4	96.90	0.400	1.59	ND	ND		2	WG1114526
cis-1,2-Dichloroethene	156-59-2	96.90	0.400	1.59	ND	ND		2	WG1114526
trans-1,2-Dichloroethene	156-60-5	96.90	0.400	1.59	ND	ND		2	WG1114526
1,2-Dichloropropane	78-87-5	113	0.400	1.85	ND	ND		2	WG1114526
cis-1,3-Dichloropropene	10061-01-5	111	0.400	1.82	ND	ND		2	WG1114526
trans-1,3-Dichloropropene	10061-02-6	111	0.400	1.82	ND	ND		2	WG1114526
1,4-Dioxane	123-91-1	88.10	0.400	1.44	ND	ND		2	WG1114526
Ethanol	64-17-5	46.10	1.26	2.38	73.1	138		2	WG1114526
Ethylbenzene	100-41-4	106	0.400	1.73	0.439	1.90		2	WG1114526
4-Ethyltoluene	622-96-8	120	0.400	1.96	1.01	4.97		2	WG1114526
Trichlorofluoromethane	75-69-4	137.40	0.400	2.25	ND	ND		2	WG1114526
Dichlorodifluoromethane	75-71-8	120.92	0.400	1.98	ND	ND		2	WG1114526
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.400	3.07	ND	ND		2	WG1114526
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.400	2.80	ND	ND		2	WG1114526
Heptane	142-82-5	100	0.400	1.64	0.486	1.99		2	WG1114526
Hexachloro-1,3-butadiene	87-68-3	261	1.26	13.5	ND	ND		2	WG1114526
n-Hexane	110-54-3	86.20	0.400	1.41	ND	ND		2	WG1114526
Isopropylbenzene	98-82-8	120.20	0.400	1.97	ND	ND		2	WG1114526
Methylene Chloride	75-09-2	84.90	0.400	1.39	0.571	1.98		2	WG1114526
Methyl Butyl Ketone	591-78-6	100	2.50	10.2	ND	ND		2	WG1114526
2-Butanone (MEK)	78-93-3	72.10	2.50	7.37	14.7	43.4		2	WG1114526
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	2.50	10.2	ND	ND		2	WG1114526
Methyl methacrylate	80-62-6	100.12	0.400	1.64	ND	ND		2	WG1114526
MTBE	1634-04-4	88.10	0.400	1.44	ND	ND		2	WG1114526
Naphthalene	91-20-3	128	1.26	6.60	ND	ND		2	WG1114526
2-Propanol	67-63-0	60.10	2.50	6.15	83.6	205		2	WG1114526
Propene	115-07-1	42.10	0.800	1.38	ND	ND		2	WG1114526
Styrene	100-42-5	104	0.400	1.70	ND	ND		2	WG1114526
1,1,2,2-Tetrachloroethane	79-34-5	168	0.400	2.75	ND	ND		2	WG1114526
Tetrachloroethylene	127-18-4	166	0.400	2.72	ND	ND		2	WG1114526
Tetrahydrofuran	109-99-9	72.10	0.400	1.18	1.87	5.51		2	WG1114526
Toluene	108-88-3	92.10	0.400	1.51	0.720	2.71		2	WG1114526
1,2,4-Trichlorobenzene	120-82-1	181	1.26	9.33	ND	ND		2	WG1114526

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.400	2.18	1.21	6.59		2	WG1114526
1,1,2-Trichloroethane	79-00-5	133	0.400	2.18	ND	ND		2	WG1114526
Trichloroethylene	79-01-6	131	0.400	2.14	92.9	498		2	WG1114526
1,2,4-Trimethylbenzene	95-63-6	120	0.400	1.96	1.39	6.83		2	WG1114526
1,3,5-Trimethylbenzene	108-67-8	120	0.400	1.96	0.523	2.57		2	WG1114526
2,2,4-Trimethylpentane	540-84-1	114.22	0.400	1.87	ND	ND		2	WG1114526
Vinyl chloride	75-01-4	62.50	0.400	1.02	ND	ND		2	WG1114526
Vinyl Bromide	593-60-2	106.95	0.400	1.75	ND	ND		2	WG1114526
Vinyl acetate	108-05-4	86.10	0.400	1.41	ND	ND		2	WG1114526
m&p-Xylene	1330-20-7	106	0.800	3.47	2.04	8.83		2	WG1114526
o-Xylene	95-47-6	106	0.400	1.73	0.761	3.30		2	WG1114526
1,1-Difluoroethane	75-37-6	66.05	0.400	1.08	ND	ND		2	WG1114526
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*98.5*				WG1114526

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	2.50	5.94	10.2	24.3		2	WG1114526
Allyl chloride	107-05-1	76.53	0.400	1.25	ND	ND		2	WG1114526
Benzene	71-43-2	78.10	0.400	1.28	ND	ND		2	WG1114526
Benzyl Chloride	100-44-7	127	0.400	2.08	ND	ND		2	WG1114526
Bromodichloromethane	75-27-4	164	0.400	2.68	ND	ND		2	WG1114526
Bromoform	75-25-2	253	1.20	12.4	ND	ND		2	WG1114526
Bromomethane	74-83-9	94.90	0.400	1.55	ND	ND		2	WG1114526
1,3-Butadiene	106-99-0	54.10	4.00	8.85	ND	ND		2	WG1114526
Carbon disulfide	75-15-0	76.10	0.400	1.24	ND	ND		2	WG1114526
Carbon tetrachloride	56-23-5	154	0.400	2.52	ND	ND		2	WG1114526
Chlorobenzene	108-90-7	113	0.400	1.85	ND	ND		2	WG1114526
Chloroethane	75-00-3	64.50	0.400	1.06	ND	ND		2	WG1114526
Chloroform	67-66-3	119	0.400	1.95	ND	ND		2	WG1114526
Chloromethane	74-87-3	50.50	0.400	0.826	ND	ND		2	WG1114526
2-Chlorotoluene	95-49-8	126	0.400	2.06	ND	ND		2	WG1114526
Cyclohexane	110-82-7	84.20	0.400	1.38	ND	ND		2	WG1114526
Dibromochloromethane	124-48-1	208	0.400	3.40	ND	ND		2	WG1114526
1,2-Dibromoethane	106-93-4	188	0.400	3.08	ND	ND		2	WG1114526
1,2-Dichlorobenzene	95-50-1	147	0.400	2.40	ND	ND		2	WG1114526
1,3-Dichlorobenzene	541-73-1	147	0.400	2.40	ND	ND		2	WG1114526
1,4-Dichlorobenzene	106-46-7	147	0.400	2.40	ND	ND		2	WG1114526
1,2-Dichloroethane	107-06-2	99	0.400	1.62	ND	ND		2	WG1114526
1,1-Dichloroethane	75-34-3	98	0.400	1.60	ND	ND		2	WG1114526
1,1-Dichloroethene	75-35-4	96.90	0.400	1.59	ND	ND		2	WG1114526
cis-1,2-Dichloroethene	156-59-2	96.90	0.400	1.59	ND	ND		2	WG1114526
trans-1,2-Dichloroethene	156-60-5	96.90	0.400	1.59	ND	ND		2	WG1114526
1,2-Dichloropropane	78-87-5	113	0.400	1.85	ND	ND		2	WG1114526
cis-1,3-Dichloropropene	10061-01-5	111	0.400	1.82	ND	ND		2	WG1114526
trans-1,3-Dichloropropene	10061-02-6	111	0.400	1.82	ND	ND		2	WG1114526
1,4-Dioxane	123-91-1	88.10	0.400	1.44	ND	ND		2	WG1114526
Ethanol	64-17-5	46.10	1.26	2.38	21.2	40.0		2	WG1114526
Ethylbenzene	100-41-4	106	0.400	1.73	ND	ND		2	WG1114526
4-Ethyltoluene	622-96-8	120	0.400	1.96	0.787	3.86		2	WG1114526
Trichlorofluoromethane	75-69-4	137.40	0.400	2.25	ND	ND		2	WG1114526
Dichlorodifluoromethane	75-71-8	120.92	0.400	1.98	0.405	2.00		2	WG1114526
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	0.400	3.07	ND	ND		2	WG1114526
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.400	2.80	ND	ND		2	WG1114526
Heptane	142-82-5	100	0.400	1.64	0.417	1.71		2	WG1114526
Hexachloro-1,3-butadiene	87-68-3	261	1.26	13.5	ND	ND		2	WG1114526
n-Hexane	110-54-3	86.20	0.400	1.41	ND	ND		2	WG1114526
Isopropylbenzene	98-82-8	120.20	0.400	1.97	ND	ND		2	WG1114526
Methylene Chloride	75-09-2	84.90	0.400	1.39	0.587	2.04		2	WG1114526
Methyl Butyl Ketone	591-78-6	100	2.50	10.2	ND	ND		2	WG1114526
2-Butanone (MEK)	78-93-3	72.10	2.50	7.37	ND	ND		2	WG1114526
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	2.50	10.2	ND	ND		2	WG1114526
Methyl methacrylate	80-62-6	100.12	0.400	1.64	ND	ND		2	WG1114526
MTBE	1634-04-4	88.10	0.400	1.44	ND	ND		2	WG1114526
Naphthalene	91-20-3	128	1.26	6.60	1.38	7.24		2	WG1114526
2-Propanol	67-63-0	60.10	2.50	6.15	22.6	55.4		2	WG1114526
Propene	115-07-1	42.10	0.800	1.38	ND	ND		2	WG1114526
Styrene	100-42-5	104	0.400	1.70	ND	ND		2	WG1114526
1,1,2,2-Tetrachloroethane	79-34-5	168	0.400	2.75	ND	ND		2	WG1114526
Tetrachloroethylene	127-18-4	166	0.400	2.72	ND	ND		2	WG1114526
Tetrahydrofuran	109-99-9	72.10	0.400	1.18	1.37	4.04		2	WG1114526
Toluene	108-88-3	92.10	0.400	1.51	0.549	2.07		2	WG1114526
1,2,4-Trichlorobenzene	120-82-1	181	1.26	9.33	ND	ND		2	WG1114526

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	0.400	2.18	ND	ND		2	WG1114526
1,1,2-Trichloroethane	79-00-5	133	0.400	2.18	ND	ND		2	WG1114526
Trichloroethylene	79-01-6	131	0.400	2.14	3.19	17.1		2	WG1114526
1,2,4-Trimethylbenzene	95-63-6	120	0.400	1.96	1.11	5.43		2	WG1114526
1,3,5-Trimethylbenzene	108-67-8	120	0.400	1.96	ND	ND		2	WG1114526
2,2,4-Trimethylpentane	540-84-1	114.22	0.400	1.87	ND	ND		2	WG1114526
Vinyl chloride	75-01-4	62.50	0.400	1.02	ND	ND		2	WG1114526
Vinyl Bromide	593-60-2	106.95	0.400	1.75	ND	ND		2	WG1114526
Vinyl acetate	108-05-4	86.10	0.400	1.41	ND	ND		2	WG1114526
m&p-Xylene	1330-20-7	106	0.800	3.47	1.58	6.84		2	WG1114526
o-Xylene	95-47-6	106	0.400	1.73	0.595	2.58		2	WG1114526
1,1-Difluoroethane	75-37-6	66.05	0.400	1.08	ND	ND		2	WG1114526
(S) 1,4-Bromofluorobenzene	*460-00-4*	*175*	*60.0-140*		*96.9*				WG1114526

Method Blank (MB)

(MB) R3312407-3 05/22/18 12:37

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Acetone	U		0.0569	1.25
Allyl Chloride	U		0.0546	0.200
Benzene	U		0.0460	0.200
Benzyl Chloride	U		0.0598	0.200
Bromodichloromethane	U		0.0436	0.200
Bromoform	U		0.0786	0.600
Bromomethane	U		0.0609	0.200
1,3-Butadiene	U		0.0563	2.00
Carbon disulfide	U		0.0544	0.200
Carbon tetrachloride	U		0.0585	0.200
Chlorobenzene	U		0.0601	0.200
Chloroethane	U		0.0489	0.200
Chloroform	U		0.0574	0.200
Chloromethane	U		0.0544	0.200
2-Chlorotoluene	U		0.0605	0.200
Cyclohexane	U		0.0534	0.200
Dibromochloromethane	U		0.0494	0.200
1,2-Dibromoethane	U		0.0185	0.200
1,2-Dichlorobenzene	U		0.0603	0.200
1,3-Dichlorobenzene	U		0.0597	0.200
1,4-Dichlorobenzene	U		0.0557	0.200
1,2-Dichloroethane	U		0.0616	0.200
1,1-Dichloroethane	U		0.0514	0.200
1,1-Dichloroethene	U		0.0490	0.200
cis-1,2-Dichloroethene	U		0.0389	0.200
trans-1,2-Dichloroethene	U		0.0464	0.200
1,2-Dichloropropane	U		0.0599	0.200
cis-1,3-Dichloropropene	U		0.0588	0.200
trans-1,3-Dichloropropene	U		0.0435	0.200
1,4-Dioxane	U		0.0554	0.200
Ethylbenzene	U		0.0506	0.200
4-Ethyltoluene	U		0.0666	0.200
Trichlorofluoromethane	U		0.0673	0.200
Dichlorodifluoromethane	U		0.0601	0.200
1,1,2-Trichlorotrifluoroethane	U		0.0687	0.200
1,2-Dichlorotetrafluoroethane	U		0.0458	0.200
Heptane	U		0.0626	0.200
Hexachloro-1,3-butadiene	U		0.0656	0.630
n-Hexane	U		0.0457	0.200
Isopropylbenzene	U		0.0563	0.200

Method Blank (MB)

(MB) R3312407-3 05/22/18 12:37

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Methylene Chloride	U		0.0465	0.200
Methyl Butyl Ketone	U		0.0682	1.25
2-Butanone (MEK)	U		0.0493	1.25
4-Methyl-2-pentanone (MIBK)	U		0.0650	1.25
Methyl Methacrylate	U		0.0773	0.200
MTBE	U		0.0505	0.200
Naphthalene	U		0.154	0.630
2-Propanol	U		0.0882	1.25
Propene	U		0.0932	0.400
Styrene	U		0.0465	0.200
1,1,2,2-Tetrachloroethane	U		0.0576	0.200
Tetrachloroethylene	U		0.0497	0.200
Tetrahydrofuran	U		0.0508	0.200
Toluene	U		0.0499	0.200
1,2,4-Trichlorobenzene	U		0.148	0.630
1,1,1-Trichloroethane	U		0.0665	0.200
1,1,2-Trichloroethane	U		0.0287	0.200
Trichloroethylene	U		0.0545	0.200
1,2,4-Trimethylbenzene	U		0.0483	0.200
1,3,5-Trimethylbenzene	U		0.0631	0.200
2,2,4-Trimethylpentane	U		0.0456	0.200
Vinyl chloride	U		0.0457	0.200
Vinyl Bromide	U		0.0727	0.200
Vinyl acetate	U		0.0639	0.200
m&p-Xylene	U		0.0946	0.400
o-Xylene	U		0.0633	0.200
Ethanol	U		0.0832	0.630
1,1-Difluoroethane	U		0.0325	0.200
(S) 1,4-Bromofluorobenzene	*97.6*			*60.0-140*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312407-1 05/22/18 11:10 • (LCSD) R3312407-2 05/22/18 11:53

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethanol	3.75	4.12	3.92	110	105	52.0-158			4.93	25
Propene	3.75	4.00	3.83	107	102	54.0-155			4.15	25
Dichlorodifluoromethane	3.75	3.99	3.89	106	104	69.0-143			2.50	25
1,2-Dichlorotetrafluoroethane	3.75	3.90	3.83	104	102	70.0-130			1.70	25

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312407-1 05/22/18 11:10 • (LCSD) R3312407-2 05/22/18 11:53

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloromethane	3.75	3.91	3.75	104	100	70.0-130			4.05	25
Vinyl chloride	3.75	3.79	3.67	101	98.0	70.0-130			3.24	25
1,3-Butadiene	3.75	3.69	3.65	98.5	97.4	70.0-130			1.15	25
Bromomethane	3.75	3.57	3.61	95.2	96.1	70.0-130			1.03	25
Chloroethane	3.75	3.53	3.75	94.0	100	70.0-130			6.22	25
Trichlorofluoromethane	3.75	3.65	3.88	97.4	103	70.0-130			6.01	25
1,1,2-Trichlorotrifluoroethane	3.75	3.86	3.74	103	99.6	70.0-130			3.38	25
1,1-Dichloroethene	3.75	3.90	3.70	104	98.8	70.0-130			5.22	25
1,1-Dichloroethane	3.75	3.88	3.71	103	99.0	70.0-130			4.37	25
Acetone	3.75	4.03	3.74	107	99.7	70.0-130			7.42	25
2-Propanol	3.75	3.90	3.74	104	99.7	66.0-150			4.19	25
Carbon disulfide	3.75	3.95	3.73	105	99.5	70.0-130			5.64	25
Methylene Chloride	3.75	3.84	3.67	102	97.9	70.0-130			4.51	25
MTBE	3.75	3.83	3.65	102	97.4	70.0-130			4.79	25
trans-1,2-Dichloroethene	3.75	3.97	3.78	106	101	70.0-130			4.84	25
n-Hexane	3.75	3.87	3.72	103	99.1	70.0-130			3.88	25
Vinyl acetate	3.75	3.99	3.77	106	101	70.0-130			5.53	25
Methyl Ethyl Ketone	3.75	3.95	3.76	105	100	70.0-130			4.86	25
cis-1,2-Dichloroethene	3.75	3.89	3.75	104	100	70.0-130			3.74	25
Chloroform	3.75	3.89	3.74	104	99.7	70.0-130			3.93	25
Cyclohexane	3.75	3.94	3.73	105	99.4	70.0-130			5.38	25
1,1,1-Trichloroethane	3.75	3.88	3.71	103	98.9	70.0-130			4.39	25
Carbon tetrachloride	3.75	3.87	3.74	103	99.6	70.0-130			3.59	25
Benzene	3.75	3.92	3.78	104	101	70.0-130			3.48	25
1,2-Dichloroethane	3.75	3.88	3.83	104	102	70.0-130			1.44	25
Heptane	3.75	4.05	3.89	108	104	70.0-130			3.90	25
Trichloroethylene	3.75	3.87	3.84	103	103	70.0-130			0.763	25
1,2-Dichloropropane	3.75	3.94	3.84	105	102	70.0-130			2.71	25
1,4-Dioxane	3.75	3.95	3.89	105	104	70.0-152			1.48	25
Bromodichloromethane	3.75	3.89	3.81	104	102	70.0-130			1.97	25
cis-1,3-Dichloropropene	3.75	3.90	3.84	104	102	70.0-130			1.66	25
4-Methyl-2-pentanone (MIBK)	3.75	3.96	3.90	106	104	70.0-142			1.69	25
Toluene	3.75	3.88	3.85	103	103	70.0-130			0.831	25
trans-1,3-Dichloropropene	3.75	3.84	3.81	102	101	70.0-130			0.784	25
1,1,2-Trichloroethane	3.75	3.81	3.83	102	102	70.0-130			0.714	25
Tetrachloroethylene	3.75	3.89	3.96	104	106	70.0-130			1.94	25
Methyl Butyl Ketone	3.75	4.01	4.03	107	107	70.0-150			0.515	25
Dibromochloromethane	3.75	3.91	3.92	104	104	70.0-130			0.217	25
1,2-Dibromoethane	3.75	3.87	3.88	103	103	70.0-130			0.0716	25
Chlorobenzene	3.75	3.89	3.92	104	105	70.0-130			0.892	25

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312407-1 05/22/18 11:10 • (LCSD) R3312407-2 05/22/18 11:53

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethylbenzene	3.75	3.97	3.83	106	102	70.0-130			3.68	25
m&p-Xylene	7.50	8.05	7.83	107	104	70.0-130			2.74	25
o-Xylene	3.75	3.97	3.89	106	104	70.0-130			2.15	25
Styrene	3.75	4.08	3.99	109	106	70.0-130			2.31	25
Bromoform	3.75	4.04	3.97	108	106	70.0-130			1.82	25
1,1,2,2-Tetrachloroethane	3.75	3.92	3.86	105	103	70.0-130			1.58	25
4-Ethyltoluene	3.75	3.92	3.90	105	104	70.0-130			0.446	25
1,3,5-Trimethylbenzene	3.75	3.99	3.98	107	106	70.0-130			0.261	25
1,2,4-Trimethylbenzene	3.75	3.91	3.92	104	105	70.0-130			0.190	25
1,3-Dichlorobenzene	3.75	4.03	3.97	107	106	70.0-130			1.35	25
1,4-Dichlorobenzene	3.75	4.19	4.16	112	111	70.0-130			0.767	25
Benzyl Chloride	3.75	4.00	3.92	107	104	70.0-144			2.15	25
1,2-Dichlorobenzene	3.75	4.00	3.94	107	105	70.0-130			1.51	25
1,2,4-Trichlorobenzene	3.75	4.51	4.57	120	122	70.0-155			1.32	25
Hexachloro-1,3-butadiene	3.75	4.33	4.37	115	116	70.0-145			0.884	25
Naphthalene	3.75	4.38	4.41	117	117	70.0-155			0.481	25
Allyl Chloride	3.75	3.95	3.71	105	98.9	70.0-130			6.27	25
2-Chlorotoluene	3.75	4.07	4.04	108	108	70.0-130			0.730	25
Methyl Methacrylate	3.75	3.87	3.86	103	103	70.0-130			0.275	25
Tetrahydrofuran	3.75	3.94	3.78	105	101	70.0-140			4.06	25
2,2,4-Trimethylpentane	3.75	3.90	3.71	104	98.9	70.0-130			5.10	25
Vinyl Bromide	3.75	3.61	3.91	96.3	104	70.0-130			8.01	25
Isopropylbenzene	3.75	3.97	3.89	106	104	70.0-130			2.00	25
1,1-Difluoroethane	3.75	3.94	3.79	105	101	70.0-130			3.92	25
(S) 1,4-Bromofluorobenzene				*99.4*	*99.9*	*60.0-140*				

Method Blank (MB)

(MB) R3312450-3 05/23/18 10:03

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
2-Butanone (MEK)	U		0.0493	1.25
Trichloroethylene	U		0.0545	0.200
(S) 1,4-Bromofluorobenzene	*95.1*			*60.0-140*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312450-1 05/23/18 08:23 • (LCSD) R3312450-2 05/23/18 09:12

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Methyl Ethyl Ketone	3.75	4.55	4.62	121	123	70.0-130			1.45	25
Trichloroethylene	3.75	4.54	4.61	121	123	70.0-130			1.38	25
(S) 1,4-Bromofluorobenzene				*100*	*101*	*60.0-140*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

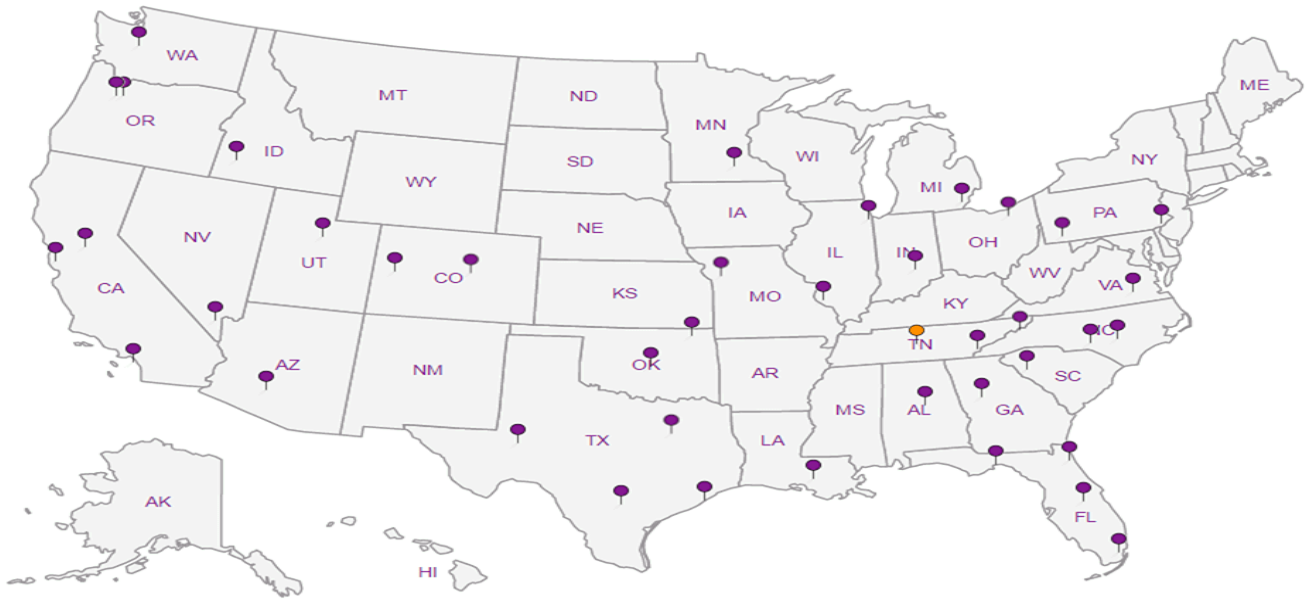
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. ESC Lab Sciences performs all testing at our central laboratory.



Company Name/Address:
Terracon
6949 South High Tech Drive
Midvale, Utah
84047

Billing Information:
TERRDUT

Report to: David Jamison

Email To: David.Jamison@Terracon.com

Project Description: Schovaers Electronics

City/State Collected: SLC UT

Phone: 801-746-3442
Fax:

Client Project # 61177082

Lab Project #

Collected by (print): David Jamison

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___ NA

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed
5 Day TAT (Terracon)

Email? ___No ✔Yes
FAX? ✔No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	VOC's TO-15	1,1-DFA
SE-VP-3	Grab	Vapor	—	5-18-18	11:~~35~~ 37	1	X	X
SE-VP-4	Grab	Vapor	—	5-18-18	11:55	1	X	X
SE-VP-1	Grab	Vapor	—	5-18-18	12:18	1	X	X
SE-VP-2	Grab	Vapor	—	5-18-18	12:51	1	X	X

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other_____

pH _____ Temp _____

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

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YOUR LAB OF CHOICE

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 1995391
Table M143
Acctnum: TERRDUT
Template:
Prelogin:
TSR: Daphne Richards
PB:
Shipped Via:

Rem./Contaminant	Sample # (lab only)
	-01
	-02
	-03
	-04

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	5-18-18	14:37	
Relinquished by : (Signature) ESCSLCUT	Date: 5/18/18	Time: 1700	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 4.4 °C Bottles Received: 4

Date: 5/19/18 Time: 09:15

Condition: OK (lab use only)

COC Seal Intact: ___Y ___N ___NA ✓

pH Checked: NCF:

L995391

Terracon

PROJECT: _____ Page _____ of _____

JOB NO. _____ Date _____ Comp. By _____ CHECKED BY: _____

SE-VP-3

Start Time	End time	Start vaccum	Final vaccum
11:34	11:39	-27	-2

SE-VP-4

Start Time	End Time	Start V.	Final V.
11:55	12:01	-27	-2

SE-VP-1

Start T	End T	Start V.	End V.
12:18	12:23	-24	-2

SE-VP-2

Start T	End T	Start V	End V
12:51	12:56	-26	-2

ESC LAB SCIENCES
Cooler Receipt Form

Client: TERRDUK	SDG#	L993391
Cooler Received/Opened On: 5/19/18	Temperature:	
Received By: Ian White		
Signature:		

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?	✓		
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			