#### Holy Cross, AK – Big Lake Targeted Brownfields Assessment

Holy Cross, Alaska

**Technical Direction Document: 14-08-0001** 

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Prepared for:

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<u>Acronym</u>	Definition
ADEC	Alaska Department of Environmental Conservation
DRO	Diesel-Range Organics
Е&Е	Ecology and Environment, Inc.
EMP	Environmental Management Plan
EPA	United States Environmental Protection Agency
GPS	Global Positioning System
GRO	Gasoline-Range Organics
IDW	Investigation-Derived Waste
NOAA	National Oceanic and Atmospheric Administration
РАН	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PEL	Probable Effects Levels
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
ROV	Remotely Operated Vehicle
RRO	Residual-Range Organics
RSL	Regional Screening Level
SQAP	Sampling and Quality Assurance Plan
SQuiRT	Screening Quick Reference Tables
START	Superfund Technical Assessment and Response Team
TBA	Targeted Brownfields Assessment
TEL	Threshold Effects Levels
VOC	Volatile Organic Compound

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## Introduction

Pursuant to the United States Environmental Protection Agency (EPA) Region 10 Superfund Technical Assessment and Response Team (START) Contract EP-S7-13-07 and Technical Direction Document number 14-08-001, Ecology and Environment, Inc. (E & E) performed a Targeted Brownfields Assessment (TBA) at the Holy Cross, AK – Big Lake site in Holy Cross, Alaska. The EPA's Brownfields Economic Redevelopment Initiative is designed to empower states, cities, tribes, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse brownfields sites (EPA 2002).

The purpose of this project is to investigate new and previously identified recognized environmental conditions (RECs) at the site in coordination with stakeholders. Stakeholders consist of the Holy Cross Village Council, City of Holy Cross, Deloycheet Incorporated (an Alaska Native Village Corporation), the Alaska Department of Environmental Conservation (ADEC), the EPA, and the Yukon River Inter-Tribal Watershed Council. The assessment included sampling of specific areas within the site related to RECs and determining whether clean up at the site will be necessary. At each step of the TBA process, the EPA sought input and concurrence with stakeholders, including determining the final outcome of each REC.

The objective of this TBA report is to present the results of the limited site sampling for preliminary site characterization purposes. This report is organized as follows:

- Section 1 (Introduction): Authority for performance of this work and summary of report contents.
- Section 2 (Site Background): Description of site conditions, history, and site concerns.
- Section 3 (Recognized Environmental Conditions): Description of RECs investigated for this TBA.
- Section 4 (Investigation and Results): Summary of the field effort and chemicals detected at the site and a comparison of detected chemical concentrations to criteria values.

- Section 5 (Cleanup Options and Cost Estimate): Discussion of potential cleanup options and their estimated costs.
- Section 6 (Findings and Summary): Summary of site conditions and conclusions drawn based on the information gathered during this investigation.
- Section 7 (References): List of references cited throughout the text.

# Site Background

The following sections describe the site location and background, site history, general environmental setting, historical property use, future uses of the property, and the START site visit.

Site Name	Holy Cross, AK – Big Lake
Site Address	None
Latitude/Longitude	62.193897/-159.775606
Reference Point for Coordinates	Center of Lake
Horizontal Collection Method	Global Positioning System
Horizontal Reference Datum	World Geodetic System 1984
Lagel Description	Township 24 North, Range 57 West,
Legal Description	Section 5
Parcel Number	Block 26, Parcel E of U.S. Survey
Parcer Number	No. 732
Acres	4 to 5
	Deloycheet Incorporated
Site Owner	P.O. Box 228
She Owner	Holy Cross, AK 99602
	(907) 476-7177

#### 2.1 Site Description

#### 2.2 Site Summary

Holy Cross is located in interior Alaska on the west bank of the Walker Slough off the Yukon River (see Figures 2-1 and 2-2), approximately 40 miles northwest of Aniak and 120 miles northeast of Bethel. The Big Lake site is a former dump site that was used from the late 1960s to late 1970s. Big Lake is located on the south side of Holy Cross and occupies approximately 4 to 5 acres of land (see Figure 2-2). In the past, Big Lake reportedly was longer and wider than it is now. The change in size is primarily due to backfilling that occurred on the north end of the lake, where the lake is believed to have once extended north as far as a former City of Holy Cross shop building, and on the west side where construction of a gravel road encroached into the lake. It has been speculated by a member of the Holy Cross Village Council that the lake in its present condition is about half of its original size. (SLR 2009)

A member of the Holy Cross Village Council was interviewed for the Environmental Management Plan (EMP) and said that in the past Big Lake was used for swimming and contained pike and white fish. Beavers and small pike inhabit the lake. The pike are not consumed due to negative public perceptions over water quality. The lake is used for canoe races, ice picking contests, and limited ice skating. One person drowned in the lake and it is not known whether this person's remains were recovered from the lake (SLR 2009). Algae blooms are commonly observed on the east side of the lake in the summer (E & E 2015a).

#### 2.3 Site Ownership

Land on which the site rests is owned by Deloycheet Incorporated, and located on Block 26, Parcel E of U.S. Survey No. 732 (SLR 2009).

#### 2.4 Environmental Setting

Prior to this TBA, the depth of Big Lake was not known, but it had been indicated in the EMP that the lake was shallower in some areas with terraces down to deeper areas of the lake. In an effort to drain the lake, a trench was dug, but the effort was unsuccessful (time period unknown). The trench remains, but there is no known discharge from the lake. Reportedly, the lake was used as a water source during a forest fire. During five days of constant pumping, the lake's water level was lowered less than a foot and recovered within one day. The site is located approximately 0.5 miles west of the Yukon River in an area subject to flooding. (SLR 2009)

#### 2.5 Historical Property Use

Logs were once floated in the lake and used at a sawmill that was formerly located near the lake's northeast shore. Reportedly, this sawmill was pushed into the lake when it became inoperable. It is reported that a safe, copper pipe, bicycles, tires, car parts, soda cans, and a fire hydrant have been removed from the lake. Other items reportedly observed in, or pulled from, Big Lake have included 55-gallon drums, deceased animals, household refuge, vehicles, and batteries. The total amount and distribution of debris in the lake is not known. (SLR 2009)

The main potential contaminant source area for Big Lake is the north end of the lake closest to the former City landfill. This area of the lake is where a majority of dumping activities likely occurred. The south end of Big Lake may also be a contaminant source area as several 55-gallon barrels were observed there. (SLR 2009)

#### 2.6 Nearby Potential Sources

Several sources of hazardous chemicals or contaminants are located near Big Lake. These sources may impact Big Lake through migration via overland flow or via groundwater. These source areas include:

• The City Shop. The City of Holy Cross maintenance shop building

(known as "The City Shop") is located immediately to the north of Big Lake (see Figure 2-2). The City Shop was constructed in the 1980s and has been used since that time for storage and maintenance of City-owned equipment. Prior to that, this location was used as a recreation site, sawmill, and landfill. To prepare the land for construction of The City Shop, the area was covered with gravel. It is not clear whether the landfill material was excavated and transported to a new landfill, or whether this material is still in place under the gravel pad placed in this area. (SLR 2009)

Items used at The City Shop that may contain hazardous chemicals are used oil, engine oil, heavy duty coolant, hydraulic oil, transmission fluid, heavy duty motor oil, antifreeze, gasoline, muriatic acid, primer, paint and stain, lead-acid batteries, and dissolved acetylene. Stained soil has been observed inside and outside of The City Shop; most stained soil was reportedly located under equipment or near drums. Contaminants associated with the former landfill may include metals, petroleum products and wastes, paints, solvents, tires, vehicles, construction materials, and general household wastes. (SLR 2009)

• Sewage Lagoons. The City of Holy Cross operates a waste water treatment system, including two sewage lagoons, northeast of Big Lake (see Figure 2-2). The eastern, primary lagoon is 1.6 acres and the secondary percolation lagoon is 1 acre. The primary lagoon has a rubber liner. The waste water treatment system operator indicated the lagoons have berms that appear to be constructed above the flood stage of the Yukon River. The river has not flooded the lagoons since they were placed into operation, and the lagoons have not overflowed. The operator stated the water level in the primary lagoon has not been higher then approximately 7 feet below the top of its perimeter dike (E & E 2015a). Based on the lagoon construction details and lack of releases from them, it appears unlikely that they could negatively impact Big Lake.

#### 2.7 Previous Investigations

No previous environmental sampling has been conducted at the lake.

#### 2.8 Projected/Proposed Site Uses

Stakeholders are interested in restoring Big Lake so it can be used for recreational activities, such as swimming, ice skating, fishing, picnicking, and walking. Restoration of Big Lake would benefit the community of Holy Cross by preserving subsistence habitat, protecting the surrounding environment, and providing a recreational site. The Holy Cross Tribal Council is highly supportive of Big Lake's restoration because it is near the location of a new Tribal Facility that is currently under construction. The Holy Cross community is especially interested in using the lake for recreational purposes because fuel costs make it more difficult for people travel to cleaner lakes that are farther away (Holy Cross Village Council 2014).

With regard to potential lake recovery efforts, it should be noted that there reportedly is no space in the city of Holy Cross for land spreading or soil stockpiling as most of the land in the area is within the Yukon River floodplain (E & E 2015a).

# Recognized Environmental Conditions

Based on the information contained in Section 2, the following items were included as potential or known RECs for this TBA:

- **Contaminated Sediment and Surface Water in Big Lake:** Sediment and surface water in Big Lake may be contaminated as a result of former dumping practices, via migration from contaminants at the former landfill/city shop property, or from the present-day sewage lagoons. Potential contaminants include: metals, polycyclic aromatic hydocarbons (PAHs), volatile organic compounds (VOCs), gasoline-range organics (GRO), diesel-range organics (DRO), residual-range organics (RRO); and possibly chlorinated pesticides and polychlorinated biphenyl (PCBs).
- **Debris in Big Lake:** A variety of items remain in the lake including 55gallon drums, deceased animals, household refuge, vehicles, bicycles, and batteries and possibly a sawmill. These items represent a physical hazard to recreational users and wildlife and may also contribute to additional release of hazardous chemicals to the lake as they decay. Potential contaminants include: metals, PAHs, VOCs, GRO, DRO, and RRO.

It appears no prior environmental sampling or testing of any kind has been conducted to assess the RECs listed above. As part of this TBA, surface sediment and surface water samples were collected and an underwater camera survey was conducted, in an effort to address on-site RECs.

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# **Investigation and Results**

E & E conducted field sampling at the Holy Cross, AK – Big Lake site from June 16 to 19, 2015. Fieldwork was conducted in coordination with the Holy Cross Village Council and the City of Holy Cross.

#### 4.1 Potential Site Contaminants

Several types of contaminants may have been released as a result of debris disposal into Big Lake. These include metals from metal debris and batteries and petroleum-related contaminants from equipment, vehicles, and drums including PAHs, VOCs, GRO, DRO, RRO; and possibly chlorinated pesticides and PCBs.

#### 4.2 Criteria Values

Criteria values to be applied to analytical data obtained under this project are presented in Table 4-1. ADEC and the EPA do not have published cleanup standards for sediment or surface water data. For this reason, sediment results will be compared to EPA soil Regional Screening Levels (RSLs) for direct contact in a residential scenario. Surface water samples will be compared to EPA RSLs for residential tap water ingestion to provide an indication of potential human exposure risk for persons coming into contact with the sediments and waters of Big Lake. RSLs are not cleanup values, though exceedances can provide an indication of the potential need for further assessment or for site cleanup. RSLs are risk-based values derived from equations that combine exposure assumptions with chemical-specific toxicity values. The use of RSLs as criteria values for this TBA provides an extremely conservative indication of human exposure risk given the expected limited use of Big Lake by recreational users.

Sediment and surface water results were additionally compared to values contained in National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQuiRT) to provide an indication of potential risks to aquatic life from exposure to possible contaminants in Big Lake. It should be noted that as with EPA RSLs, NOAA SQuiRT values are not cleanup values, but rather speak to the possibility of negative impacts to biota.

The NOAA SQuiRTs include multiple screening values to help portray a spectrum of concentrations associated with various probabilities of adverse biological effects. This spectrum ranges from presumably nearly non-toxic to

toxic levels. For this TBA, sediment sample results were compared first to NOAA SQuiRT freshwater Threshold Effects Levels (TEL). Contaminants below these levels have a low probability of being toxic, as tested through standard bioassays. However, concentrations exceeding TELs do not necessarily predict toxicity. For this reason, contaminant concentrations in sediment samples were also compared to NOAA SQuiRT freshwater Probable Effects Levels (PELs). Exceedances of these values are more likely to be associated with toxic concentrations. Surface water sample results were compared to NOAA SQuiRT freshwater chronic and acute values.

At the onset of project planning, it was known that the detection limits for some of the analytical methods outlined for this project would not meet the proposed criteria values. Since these criteria values are not cleanup standards and since nearly all criteria values would be met, use of the proposed analytical methods were considered to be appropriate as they would achieve the project objective of providing an indication of lake contamination.

#### 4.3 Analytical Methods

All sediment and surface water samples collected during this TBA were submitted for fixed laboratory analysis. The samples were analyzed by Test America, Inc. in Tacoma, Washington, for the following parameters:

- Metals using EPA Methods 6010C, 6020A, 7470A, and 7071A;
- VOCs using EPA Method 8260;
- PCBs using EPA Method 8082;
- Chlorinated pesticides using EPA Method 8081;
- PAHs using EPA Method 8270;
- GRO using ADEC Method AK-101;
- DRO using ADEC Method AK-102; and
- RRO using ADEC Method AK-103.

Copies of quality assurance/quality control (QA/QC) and data validation memoranda are provided in Appendix F.

#### 4.4 Reporting of Sample Results

The analytical results summary tables provided in this section are a condensed version of the laboratory data provided in Appendix F. Omitted data and the presentation of data in the summary tables are as follows:

- Analytes that were not detected in any samples were omitted from their respective tables.
- All detected concentrations are shown in bold type; a non-detect concentration is shown as the detection limit reported by the laboratory (e.g., 0.66 U).

- The regulatory standards provided in the first column of these tables were used as criteria values in determining whether contamination is present in the samples.
- Analytes detected at concentrations greater than the criteria value were considered a potential concern, and the concentration is shaded.
- Analytes with no comparative criteria levels are listed in the tables, but could not be qualitatively evaluated.

Based on EPA Region 10 policy, evaluation of aluminum, calcium, iron, magnesium, potassium, and sodium (i.e., common earth crust metals) is generally used only in mass tracing, which is beyond the scope of this report. Furthermore, these analytes are not associated with toxicity to humans under normal circumstances (EPA 1996). For these reasons, these analytes are not included in the evaluation or discussion, but are provided in the analytical summary tables if they were detected above the instrument detection limit.

#### 4.5 Sampling Design

A judgmental sampling design was used for the Holy Cross, AK – Big Lake site TBA to fulfill project-specific objectives by collecting biased data required for preliminary site characterization. The following subsections describe the types of sampling, analysis, and measurements that were conducted. Samples were collected in accordance with an approved sampling and quality assurance plan (SQAP; E & E 2015b). Photographic documentation of the sample collection event is provided in Appendix A.

When deviations from the SQAP were required, they were noted in the field logbook, recorded on the Sample Plan Alteration Form (Appendix B), and approved by the EPA Task Monitor. Deviations from the SQAP are also detailed below.

A total of 15 samples (including QA/QC samples) were collected during the field event (see Figure 4-1). A description of each sample submitted for fixed laboratory analysis is provided in Table 4-2.

Table 4-3 summarizes the sample coding system used for formulating sample numbers. For example, the sample number BL01SD indicates the following:

- BL stands for the source code (in this case, for the Holy Cross, AK Big Lake site).
- 01 stands for the sequential number of samples from a given source by matrix (in this case, the first sediment sample).
- SD stands for the sample matrix (in this case, sediment).

The frequencies of exceedance of regulatory criteria values are provided in Table 4-4. Summaries of analytical data are provided in Table 4-5 (sediment samples)

and Table 4-6 (surface water samples).

Investigative activities conducted at the site included an underwater camera survey, and sampling of sediment and surface water from Big Lake. To address the RECs, the following sampling activities were conducted.

#### 4.5.1 Sampling Methodologies

#### 4.5.1.1 Sediment Sampling

Surface sediment samples were collected from 0 to 6 inches below the surface using a dedicated stainless steel spoon. Collected material was placed in a dedicated stainless steel bowl, thoroughly homogenized and placed into a pre-labeled container. The VOC and GRO aliquots were removed using 5-gram Core-N-One<sup>TM</sup> samplers (or equivalent) prior to homogenization.

#### 4.5.1.2 Surface Water Sampling

Surface water samples were collected by directly dipping the sample container into the water to fill the container.

#### 4.5.2 Sampling of RECs and Analytical Results

Two RECs were identified at the site. These are contaminated sediment and surface water in Big Lake and debris in Big Lake. These RECs were evaluated as a part of the TBA via the following actions.

#### 4.5.2.1 Contaminated Sediment in Big Lake

Five surface sediment samples (BL01SD through BL05SD) were collected from the northern side of Big Lake, at approximate 200-foot intervals (see Figure 4-1). All sediment samples were collected within the first 6 inches of material and within the waters of the lake. Sample locations were biased toward observed debris. Specifically, BL01SD was collected at a location nearest the former sawmill and landfill and near a location that had wood debris (see Photos 1 and 2) and a metal crate in the lake; BL03SD was collected near an empty 5-gallon container that was in the lake (see Photo 9).

The SQAP proposed collecting up to 13 sediment samples from the lake. During the field event, it was determined that proposed locations on the south side of the lake could not be accessed on foot due to marshy conditions on that side of the lake (see Photos 17 and 18). Also, since that side of the lake had no shore (marshy grasses in ~3 feet of water constituted that shoreline), it was not possible to use an available raft to sample that area (see Sample Plan Alteration Form in Appendix B).

Analytical results are presented in Table 4-5 and indicate that six metals (arsenic, cadmium, copper, manganese, nickel, and zinc) exceeded criteria values in sediment samples. Arsenic concentrations exceeded the EPA dermal contact RSL for soil in a residential setting in all samples. All but one location (BL04SD) also exceeded the NOAA SQuiRT freshwater TEL value. However, arsenic concentration did not exceed the NOAA SQuiRT freshwater PEL value.

Cadmium exceeded the NOAA SQuiRT freshwater TEL value in one sample (BL01SD); though this concentration did not exceed the NOAA SQuiRT freshwater PEL value. Copper, manganese, and nickel exceeded NOAA SQuiRT freshwater TEL values in all sediment samples, but these concentrations did not exceed NOAA SQuiRT freshwater PEL values (note: manganese does not have a NOAA SQuiRT freshwater PEL value and there are no EPA residential RSL dermal contact values for these three analytes). Zinc exceeded the NOAA SQuiRT freshwater TEL value in one sample (BL01SD), though this concentration did not likewise exceed the NOAA SQuiRT freshwater PEL value or the EPA residential RSL dermal contact value.

Two PAHs [benzo(a)anthracene and fluoranthene] exceeded criteria values in one sample (BL01SD). These concentrations exceeded the NOAA SQuiRT freshwater TEL values, though they did not exceed the NOAA SQuiRT freshwater PEL values or EPA residential RSL dermal contact values.

No other metals or PAHs and no VOCs, pesticides, PCBs, GRO, DRO, or RRO exceeded regulatory criteria.

#### 4.5.2.2 Contaminated Surface Water in Big Lake

Seven surface water samples (BL01SW, BL02SW, and BL04SW through BL08SW) were collected along the shore of Big Lake (see Figure 4-1). Four of these samples were co-located with sediment sample locations. These co-located pairs were BL01SD/BL01SW, BL02SD/BL02SW, BL04SD/BL04SW, and BL05SD/BL05SW. Samples BL01SW, BL02SW, BL03SW, and BL04SW were mildly turbid due to the generally murky conditions of the lake (see Photos 1, 2, 4, and 6).

Analytical results are presented in Table 4-6 and indicate the presence of barium in all seven surface water samples at concentrations that exceed the NOAA SQuiRT freshwater chronic value; however, the NOAA SQuiRT freshwater acute value and the EPA tap water RSL were not exceeded. No other metals and no VOCs, PAHs, pesticides, PCBs, GRO, DRO, or RRO exceeded regulatory criteria.

#### 4.5.2.3 Debris in Big Lake

An underwater camera survey of Big Lake was conducted by a company subcontracted to the START in order to determine the general depth profile of the lake and the types, volumes, and locations of debris disposed in the lake.

A remotely operated vehicle (ROV) was used to conduct a visual survey of the lake. To provide a systematic assessment, eight transects were established across the lake. These were numbered as A through G (see Figure 4-2). A video survey was conducted along the length of each transect and still images were recorded to document observed debris. The ROV was operated within visual distance of the lake bottom and the ROV followed an internal compass heading to travel the transect line. The lake depths were determined using a portable depth sounder

attached to a small inflatable raft. Depths were recorded at various intervals along the transect lines and at additional locations within the northern and southern ends of the lake. The depth survey revealed that the lake is quite shallow, having a maximum depth of only 12 feet (see Figure 4-2).

The water clarity was good within the first few feet of the lake water's surface, but rapidly degraded with depth to highly murky conditions near the lake bottom. Near the lake bottom, visibility was approximately 12 to 18 inches and it often was difficult to discern the lake bottom from surrounding water due to the lack of color contrast. Attempts to improve the video quality by using lights at various settings from 0 to 100 percent luminosity resulted in only minor differences in overall video quality.

Debris was observed along transects A and B and at other areas in the lake. Figure 4-3 depicts debris locations. Debris noted in and around the perimeter of the lake included wood, a metal box, a metal grate, a plastic and metal cart, a tire, building debris, two plastic buckets, a 5-gallon container, and two 55-gallon drums. The 5-gallon container was empty and unmarked. The drums also were not marked. The drum on the north side of the lake contains some fluid ( $\sim$ 1/4 full); it could not be discerned whether the fluid in the drum was rain water or an industrial or petroleum product. The drum on the south side of the lake could not be reached to assess its contents. Due to limited visual conditions, it was not possible to view the entire lake bottom. For this reason, it is expected that not all debris in the lake was successfully located.

Appendix C provides the ROV debris survey report which includes several still images of underwater debris from the ROV video.

#### 4.6 Global Positioning System

Global Positioning System (GPS) coordinates of five TBA sample locations were collected utilizing a Trimble<sup>TM</sup> Geo XH handheld unit with a Zephyr<sup>TM</sup> external antenna or a Trimble ProXR<sup>TM</sup> with a TDC1 data logger. Recorded GPS coordinates by sample point are listed in Appendix D. The coordinates for three sample locations (BL06SW, BL07SW, and BL08SW) were not recorded since these locations could not be accessed by the START due to marshy conditions. These locations were accessed by raft by the START subcontracted underwater video camera survey crew.

#### 4.7 Investigation-Derived Waste

Investigation-derived waste (IDW) generated during the Big Lake TBA sampling event included disposable sampling supplies and disposable personal protection equipment. All disposable IDW was double-bagged in opaque plastic bags and disposed of at the local landfill in Holy Cross, Alaska.

# 5

### **Cleanup Options and Cost Estimate**

The following preliminary evaluation of cleanup options for the Big Lake site is based on the analytical data gathered during the investigation conducted for this TBA (Section 4). This TBA focused primarily on metals, VOCs, PCBs, chlorinated pesticides, PAHs, GRO, DRO, and RRO as the contaminants of concern at all sample locations. The decision to focus on these contaminants was based on available information and professional judgment. Given this limitation, it is possible that other contaminants could also be present at levels exceeding applicable regulatory criteria.

Samples collected in support of this TBA included sediment and surface water from Big Lake. Laboratory sample results for these samples did not exceed criteria values with the exception of a few metals. The metals exceedances were primarily of NOAA SQuiRT TELs in sediment rather than NOAA SQuiRT PELs which are more likely to be toxic to aquatic life. For this reason, cleanup or remediation of lake sediments or surface water does not appear to be necessary.

Two 55-gallon drums were noted along the shoreline of Big Lake with one being present along the accessible north side of the lake and the other being along the inaccessible south side of the lake. The northern drum contains some unknown fluid. The southern drum's contents could not be assessed. Additionally, one empty 5-gallon container was noted in the lake. Given this, it is expected that there may be other full or partially full containers at locations in the lake that were not viewed during the underwater camera survey.

Features requiring cleanup at Big Lake include the two 55-gallon drums and all debris in and adjacent to the lake. The Holy Cross Tribal Council has indicated it has available staff to conduct debris cleanup, with the exception of characterizing the 55-gallon drums and any newly discovered full or partially full containers. For this reason, this section will focus only on the characterization and potential disposal of the drums/containers. It is estimated that two 5-gallon containers requiring disposal may be discovered during cleanup activities. Changes in site conditions would require a reevaluation of the following discussion. It is recommended that ADEC be consulted prior to conducting any cleanup activities.

Cleanup options are described below, and corresponding rationale are presented in Table 5-1. A summary of estimated costs associated with each option is presented in Table 5-2. Detailed preliminary cost estimates, including notes and assumptions, are provided in Appendix E.

Cleanup options that have been evaluated for this TBA involve removing the drums and containers from the lake and enclosing them in overpack drums or other suitable secondary containers, and disposing of them and their contents at an EPA-approved disposal facility. It is not known at this time whether material in the drums/containers is hazardous which would require a Resource Conservation and Recovery Act (RCRA) Subtitle C disposal facility, or non-hazardous waste that can be disposed at a RCRA Subtitle D disposal facility. Disposal options that were considered for this TBA include transporting the waste off site for landfill disposal to either a Subtitle C or D disposal facility, as appropriate.

Although there may be local resources and equipment available, due to the remote location and safety considerations it is assumed that a boat and other equipment and supplies will need to be mobilized to Holy Cross, Alaska, by an air charter service. For cost estimating purposes, it is assumed that a vehicle and trailer to transport removal equipment, supplies, and workers from the Holy Cross airfield to the removal site at Big Lake can be obtained locally.

The drums/containers will need to be moved from their locations in or adjacent to the lake in order to sample their contents and place each in an overpack drum. The method used to remove the drums and containers will most likely involve using a small workboat equipped with a hoist. The cleanup crew would position the boat at each drum/container, remove it with a hoist and cable, and either hoist it into the boat or affix it to the boat so it can be moved to the shore. Waste hazard characterization to profile container contents and determine the appropriate disposal facility will require a sample of the material to be analyzed using the appropriate laboratory analytical methods for determining toxicity, corrosivity, reactivity, and flammability. Once ashore, the drum/container would be sampled and placed in an overpack drum suitable for transport to an off-site RCRA disposal facility.

As equipment and personnel are demobilized from the site the overpacked waste drums will be loaded onto the cargo aircraft and transported to a licensed waste treatment, storage, and disposal facility. After laboratory analyses of the waste samples are obtained, waste profiles will be developed. In this assessment, the removal actions alternatives evaluated differ in their characterization of the waste as hazardous (Option 1) or non-hazardous (Option 2).

The option of disposing the waste at the local Holy Cross, Alaska, municipal waste disposal facility was evaluated should the sample results indicate the drum/container contents are not hazardous and meet the facility's land disposal criteria. However, due to the logistics of transporting a boat, equipment, and

personnel to the project site via chartered air cargo service to retrieve and sample the drums, it would not be feasible to demobilize from the site and remobilize at a later date after the laboratory results are received and the waste profile is established. Nor would it be feasible to keep personnel on site on standby while waiting for laboratory sample results.

The cost estimate is \$57,000 for Option 1 and \$56,000 under Option 2. The two options are nearly identical in cost because the major price factors are cargo and personnel air transportation and contractor labor associated with retrieving and sampling the drums/contents. Like many remote Alaska projects, actual contractor costs for the Holy Cross, AK - Big Lake site removal vary depending on the contractor's ability to obtain equipment and supplies locally, and creative use of transportation modes.

The cost estimates included in this section were developed using vendor quotes and estimates, and the TBA project engineer's best professional judgement based on costs at similar sites. The quantities used have been estimated based on analytical data, site observations, and best engineering judgment. The work to be performed is intended to address the known environmental conditions resulting from past practices. Any additional costs incurred as a result of new or differing discoveries would be in addition to the projected estimated costs described in this section. The estimated cost includes an extra 15 percent contingency to allow for unforeseen costs. These estimates do not include additional study/investigation, design, long-term monitoring, five-year reviews, site closeout, etc.

# **Findings and Summary**

Holy Cross is located in interior Alaska on the west bank of the Walker Slough off the Yukon River. The Holy Cross, AK - Big Lake site is a former dump site that was used in the late 1960s to late 1970s. Big Lake is located on the south side of Holy Cross and occupies approximately 4 to 5 acres of land. The lake is located in an area subject to flooding by the Yukon River.

Logs were once floated in the lake for use at a sawmill that was formerly present near the lake's northeast shore. Reportedly, this sawmill was pushed into the lake when it became inoperable. A landfill once operated near the sawmill.

It also is reported that a safe, copper pipe, bicycles, tires, car parts, soda cans, and a fire hydrant have been removed from the lake over time. Other items reportedly observed in, or pulled from, Big Lake include 55-gallon drums, deceased animals, household refuge, vehicles, and batteries. The total amount and distribution of debris in the lake is not known. One person drowned in the lake and it is not known whether this person's remains were recovered from the lake.

For this TBA, the main potential contaminant source area for Big Lake was considered to be the north end of the lake that is located closest to the former landfill and is the area of the lake where a majority of dumping activities likely occurred. The south end of Big Lake also was considered to be a likely contaminant source area as several 55-gallon barrels had been observed there in the past. Prior to this TBA, no environmental sampling work had been conducted at the site and the depth of the lake was not known.

#### 6.1 REC Findings

Two RECs were identified at the site. These are contaminated sediment and surface water in Big Lake and debris in Big Lake. Sediment and surface water in Big Lake could have become contaminated as a result of former dumping practices, via migration from contaminants at the former landfill/city shop property, or from the present-day sewage lagoons. However, based on metals, VOCs, PCBs, chlorinated pesticides, PAHs, GRO, DRO, and RRO analytical results for sediment and surface water samples collected from Big Lake, and the comparison of these results to applicable regulatory standards, cleanup or remediation of lake sediments or surface water does not appear to be necessary.

With regard to debris in Big Lake, it was determined that cleanup is necessary. Features requiring cleanup include two 55-gallon drums present along the shores of the lake and all debris in and adjacent to the lake. The Holy Cross Tribal Council has indicated it has available staff to conduct debris cleanup, with the exception of drums and containers. The drums/containers represent a physical hazard to recreational users and wildlife and may also contribute to additional release of hazardous chemicals to the lake as they decay and, for this reason, require removal.

#### 6.2 Cleanup Options Summary

Cleanup options that were evaluated for this TBA involve:

- Removing the drums and containers from the lake using a boat and hoist,
- Enclosing them in overpack drums or other suitable secondary containers to protect them from leaking and to allow them to be transported,
- Sampling each container to determine appropriate shipping and disposal methods
- Shipping them to EPA-approved disposal facility, and
- Disposing of their contents as either hazardous or non-hazardous waste.

Since it presently is not known whether material in the drums/containers is hazardous, requiring RCRA Subtitle C disposal facility, or non-hazardous waste, that can be disposed at a RCRA Subtitle D disposal facility, costs for disposal at either type of facility were determined. Cleanup Option 1 is for disposal at a RCRA Subtitle C facility while Option 2 is for disposal at a RCRA Subtitle D facility. The cost of Option 1 was determined to be \$57,000 and cost of Option 2 was determined to be \$56,000. The options have similar costs because the only difference between them is whether or not the material requiring disposal is hazardous or non-hazardous. The cleanup options assume that all equipment and personnel required to complete the cleanup will need to be flown into Holy Cross; however, if some of these items can be obtained in Holy Cross, these costs could be substantially reduced. 7

# References

E & E (Ecology and Environment, Inc.). 2015a. Project Logbook, Holy Cross, AK – Big Lake. 2014 to 2015.

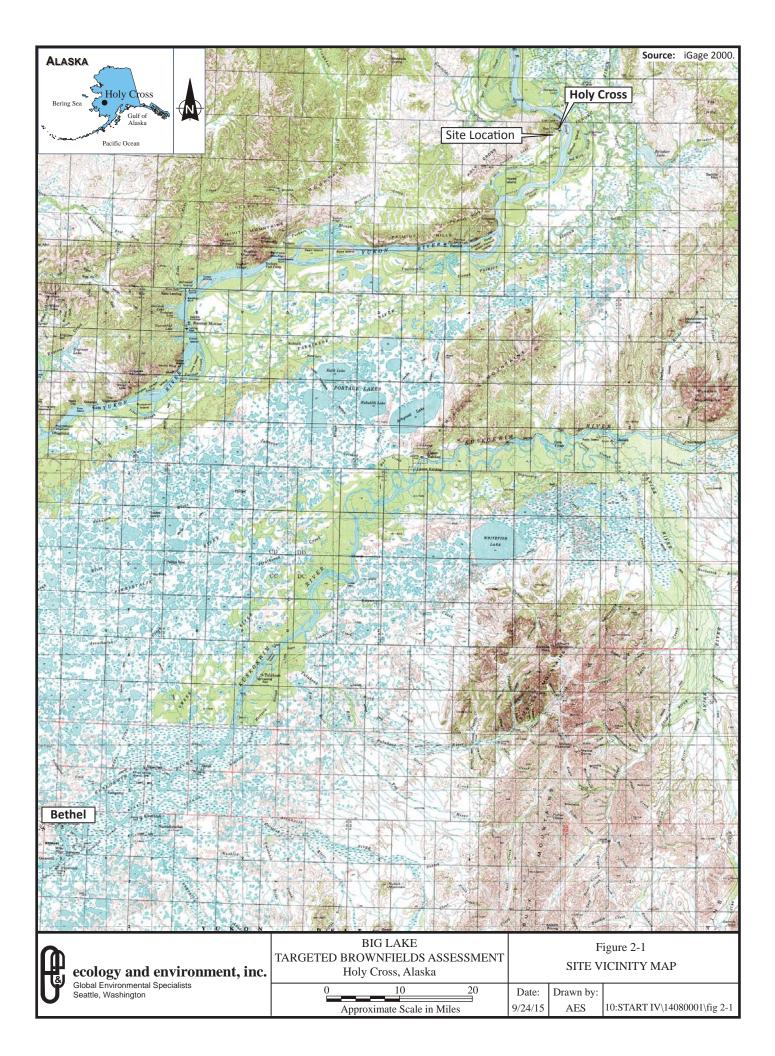
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EPA (United States Environmental Protection Agency). 2002. Brownfields Economic Redevelopment Fact Sheet, EPA 500-F-00-241.

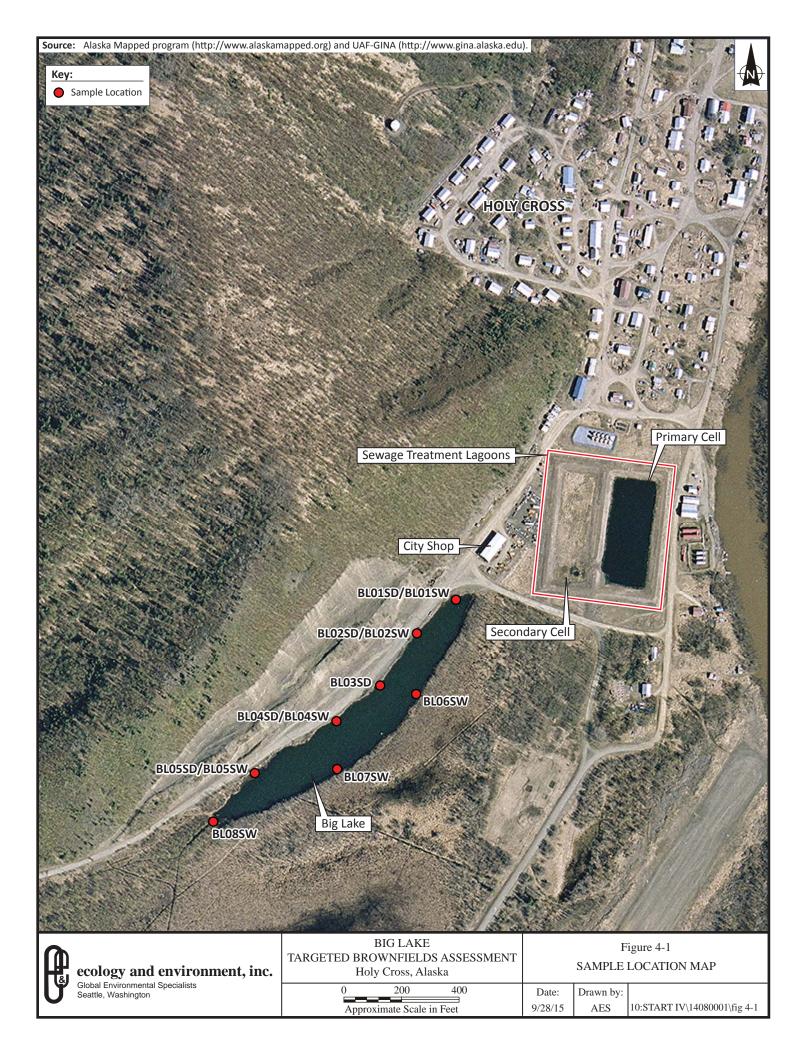
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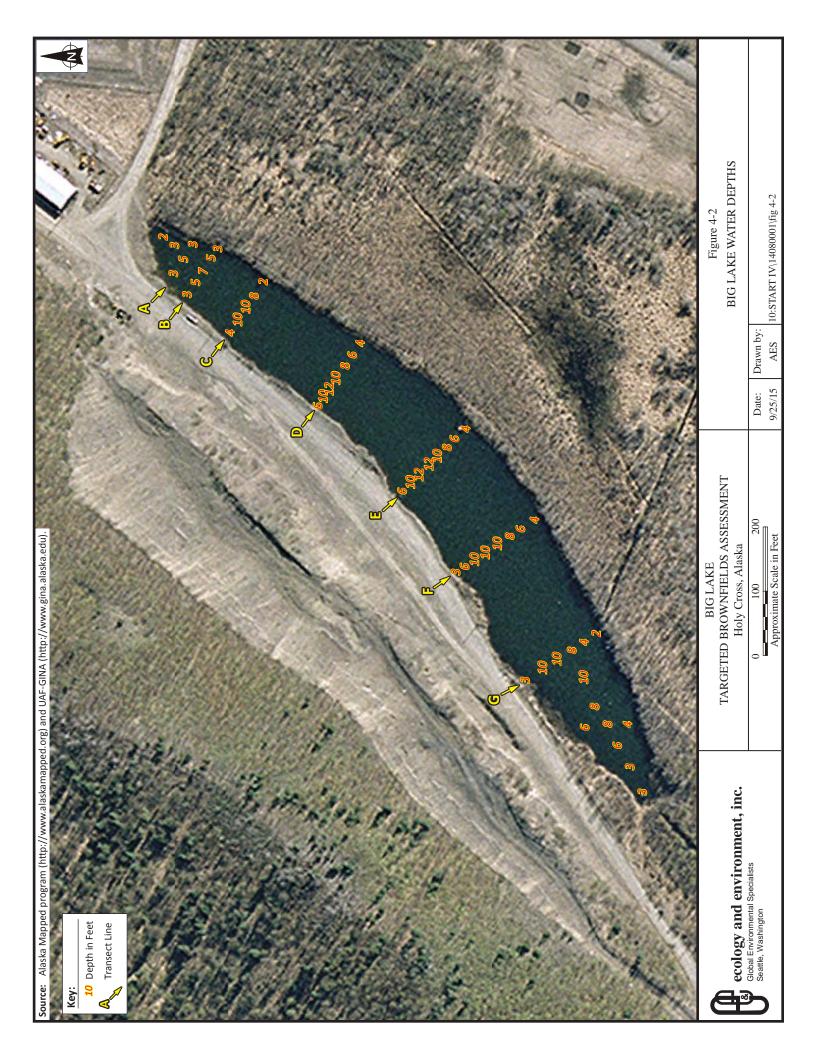
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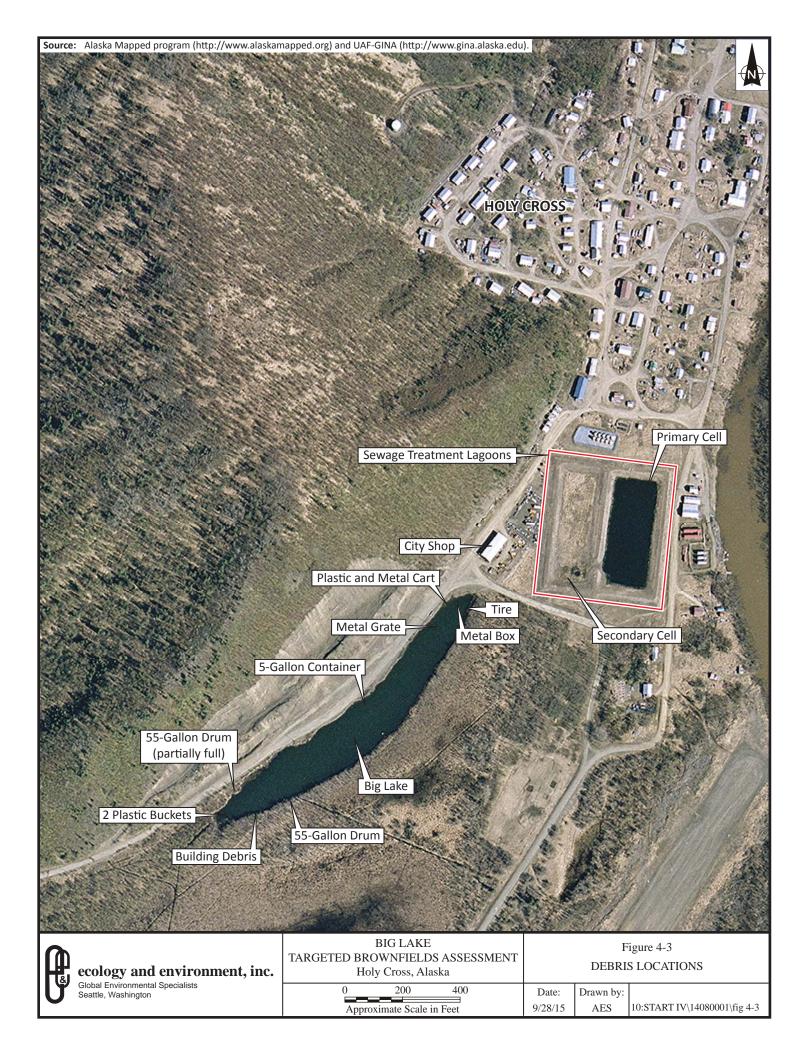
## **Figures**











# **Tables**

Table 4-1 Criteria Values												
		Laborato Reporting Li	Laboratory porting Limits	NOAA SQuiRT Freshwater Surface Water (ug/L)	NOAA SQuiRT Freshwater Surface Water (ug/L)	NOAA SQuiRT Freshwater Sediment (ug/Kg)	AA SQuiR /ater Sedii (ug/Kg)	T nent		EPA Residential RSLs	ntial RSLs	
	CAS	Water	Soil/Sedi- ment						Carcinogenic Target Risk - Soil Dermal Contact	Noncancer Child Hazard Index - Soil Dermal Contact	Carcinogenic Target Risk - Tap Water Ingestion	Noncancer Child Hazard Index - Tap Water Ingestion
Analyte Name Motele	Number	(ng/L)	(ng/Kg)	Acute	Chronic	<b>ARCS TEL</b>	ΞĒ	PEL	(ng/Kg)	(ng/Kg)	(ng/L)	(ng/L)
Aliminim	7429-90-5	189	75000	750	87	2550000	:	:	:	:	:	2000
Antimony (metallic)	7440-36-0	5	3000	88	30		ł	1	:	:	:	0.8
Arsenic, Inorganic	7440-38-2	5	500	340	150	10798	5900	17000	5100	29000	0.052	0.6
Barium	7440-39-3	10	500	110	3.9	1	ł	1	1	:	1	400
Beryllium and compounds	7440-41-7	0.5	500	35	0.66	1	ł	1	:	:	1	4
Cadmium	7440-43-9	0.14	200	7	0.25	583	596	3530	1	73000	1	I
Calcium	7440-70-2	1100	55000	;	1	;	ł	1	:	-	1	1
Chromium, Total (as Cr+3)	7440-47-3	25	1300		1	36826	37300	90006	-		-	3000
Cobalt	7440-48-4	0.5	1000	1500	m	1	ł	1	1	1	1	0.6
Copper	7440-50-8	m	2500	13	6	28012	35700	197000	1	1	1	80
Iron	7439-89-6	500	25000	:	1000	188400000	ł	1	1	:	;	1400
Lead and Compounds	7439-92-1	2	1500	65	2.5	37000	35000	91300	$8100^{a}$	1	ł	1
Magnesium	7439-95-4	1100	55000	1	1	1	ł	1	1	1	ł	1
Manganese (Water)	7439-96-5	20	1000	2300	80	630000	1	1	1	-	1	48
Mercury (elemental)	7439-97-6	0.2	20	1.4	0.77	ł	174	486	ł	1	ł	1
Nickel Soluble Salts	7440-02-0	15	1000	470	52	19514	18000	36000	1	1	ł	40
Potassium	2023695	3300	165000	373000	1	ł	ł	1	1	1	ł	ł
Selenium	7782-49-2	5	5000	13-186	5	ł	ł	1	1	1	ł	10
Silver	7440-22-4	0.15	2500	1.6	0.36	1	ł	1	1	1	1	10
Thallium (Soluble Salts)	7440-28-0	0.7	5000	110	0.03	1	1	1	1	:	1	0.02
Vanadium, Metallic	7440-62-2	5	1000	280	19	1	ł		1	:	1	10
Zinc and Compounds	7440-66-6	35	2000	120	120	98000	123000	315000	1	;	:	600
<b>Polychlorinated Biphenyls</b>												
Aroclor 1016	12674-11-2	0.5	10	:	1	1	1	1	23000	1500	1.1	0.14
Aroclor 1221	11104-28-2	0.5	10	:	-	-	ł	1	810	-	0.039	-
Aroclor 1232	11141-16-5	0.5	10	:	1	1	1	1	810	-	0.039	1
Aroclor 1242	53469-21-9	0.5	10	;	ł	ł	ł	ł	810	1	0.039	1
Aroclor 1248	12672-29-6	0.5	10	:	1	ł	ł	1	810	1	0.039	ł
Aroclor 1254	11097-69-1	0.5	10	:	1	1	60	340	810	420	0.039	1
Aroclor 1260	11096-82-5	0.5	10	:	1	1	1	1	810	1	0.039	I
Aroclor-1262	37324-23-5	0.5	10	:	1	1	ł	1	:	;	1	1
Aroclor-1268	11100-14-4	0.5	10	:	I	1	1	1	1	1	1	:

Table 4-1 Criteria Values												
		Laboratory Reporting Lim	atory g Limits	NOAA SQuiRT Freshwater Surface Water (ug/L)	SQuiRT water ↓ Water /L)	NOAA SQuiRT Freshwater Sediment (ug/Kg)	NOAA SQuiRT shwater Sedim (ug/Kg)	T nent		EPA Residential RSLs	intial RSLs	
	CAS	Water	Soil/Sedi- ment						Carcinogenic Target Risk - Soil Dermal Contact	Noncancer Child Hazard Index - Soil Dermal Contact	Carcinogenic Target Risk - Tap Water Ingestion	Noncancer Child Hazard Index - Tap Water Ingestion
Analyte Name Polycyclic Aromatic Hydrocarbons	Number	(ng/L)	(ng/Kg)	Acute	Chronic	ARCS TEL	ΤEL	PEL	(ng/Kg)	(ng/Kg)	(ng/L)	(ng/L)
Acenaphthene	83-32-9	0.1	5	1700	5.8		6.71	88.9	1	130000	1	120
Anthracene	120-12-7	0.04	5	13	0.012	10	46.9	245	1	6700000	1	600
Benz[a]anthracene	56-55-3	0.06	10	0.49	0.027	15.72	31.7	385	570	1	0.034	1
Benzo(j)fluoranthene	205-82-3	0.06	10	;	1	;	1	1	1500	:	0.065	-
Benzo[a]pyrene	50-32-8	0.02	5	0.24	0.014	32.4	31.9	782	570	1	0.0034	1
Benzo[b]fluoranthene	205-99-2	0.08	10	;	9.07	1	ł	ł	570	:	0.034	1
Benzo[k]fluoranthene	207-08-9	0.06	10	;	1	27.2	I	I	5700	1	0.34	1
Chrysene	218-01-9	0.04	5 1	;	:	26.83	57.1	862	57000	;	3.4	1
Dibenz[a,h]anthracene	53-70-3 100 75 4	0.06	0 4	:	:	10	0.22	135	150	1	0.0034	1
Ulbenzo(a,e)pyrene	4-00-70L	0.05	n v		- 100	31.46	[]		061		C0UU.U	1 00
Flintene	86-73-7	0.06	о v	006C	3.9	10	21.2	144		890000		80
Indeno[1,2,3-cd]pyrene	193-39-5	0.06	5	2 1	4.31	17.32			570		0.034	3 1
Pyrene	129-00-0	0.013	10	1	0.025	44.27	53	875	1	670000	1	60
Pesticides												
Aldrin	309-00-2	0.03	1	1.5	0.017	;	1	1	130	870	0.0046	0.06
alpha-Chlordane	5103-71-9	0.02	1	;	1	1	ł	I	1	;	1	1
Carbon disulfide	75-15-0	0.5	20	17	0.92	ł	ł	I	ł	1	ł	200
Chlordane	12789-03-6	0.02	;	1.2	0.00215	1	4.5	8.9	5600	36000	0.22	1
cis-1,3-Dichloropropene	10061-01-5	0.5 2.02	16 î	€0.0>	<0.055	1		1	1	:	1	1
DDD	72-54-8	0.03	7 7	0.19	0.011	1	3.54	8.51	9500	:	0.32	1
DDT	6-00-2/	0.02	7 0	0 55 0	CU1 0.0005		1 19	0.77 477	22000	48000	0.23	- 1
delta-BHC	319-86-8	0.05	ı —	39	2.2	1	1			-	1	• 1
Dieldrin	60-57-1	0.03	2	0.24	0.056	1	2.85	6.67	140	1500	0.0049	0.1
Endosulfan I	959-98-8	0.02	1	1	ł	ł	ł	ł	ł	1	ł	ł
Endosulfan II	33213-65-9	0.02	2	:	1	ł	ł	ł	1	;	1	1
Endosulfan sulfate	1031-07-8	0.02	2	;	2.22	1	ł	ł	-	:	1	1
Endrin	72-20-8	0.02	2	0.086	0.036	1	2.67	62.4	1	8700	ł	0.6
Endrin aldehyde	7421-93-4	0.2	5	;	0.15	1	I	I	1	:	1	1
Endrin ketone	53494-70-5	0.02	2	:	1	1	ł	ł	ł	1	ł	1
gamma-Chlordane	5103-74-2 76 44 9	0.02	c		- 0000	1	ł	ł		 15000		- 1
Heptachlor	/0-44-8	70.0	7 -	0.26	0.0019	1	1	[	010	15000	0.01/	1
Heptachlor Epoxide Hevarhloroovolohevane Alnha-	319-84-6	0.02		30	و100.0 د د		0.0	2.74	007	380 730000	0.0086	0.020
Hexactilor of your and Aupura- Hexachlorocyclohexane Beta-	319-85-7	0.05		39	2.2		1		1300 1300		0.012	0] I
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9	0.03		0.95	0.08	1	0.94	1.38	5200	22000	0.071	0.6
The second of th			•	- > >>	>>>>			)		>>> <b></b>		;

Table 4-1 Criteria Values												
		Laborat Reporting	Laboratory porting Limits	NOAA SQuiRT Freshwater Surface Water (ug/L)	SQuiRT water Water /L)	NOAA SQuiRT Freshwater Sediment (ug/Kg)	NOAA SQuiRT shwater Sedim (ug/Kg)	T nent		EPA Residential RSLs	ntial RSLs	
	CAS	Water	Soil/Sedi- ment						Carcinogenic Target Risk - Soil Dermal Contact	Noncancer Child Hazard Index - Soil Dermal Contact	Carcinogenic Target Risk - Tap Water Ingestion	Noncancer Child Hazard Index - Tap Water Ingestion
Analyte Name	Number	(ng/L)	(ug/Kg)	Acute	<b>Chronic</b>	<b>ARCS TEL</b>	TEL	PEL	(ng/Kg)	(ug/Kg)	(ng/L)	(ng/L)
Toxaphene	8001-35-2	1.1	100	0.73	0.002		0.1		2100		0.071	01
Petroleum-Related Compounds												
Diesel Range	NA	100	20000	;	;	ł	1	1	1	1	1	1
Gasoline Range	NA	50	4000	:	:	1	1	1	:	;	1	-
Residual Range	NA	100	50000	1	1	ł	I	ł	ł	1	1	ł
Volatile Organic Compounds												
Acetone	67-64-1	50	100	28000	1500	1	1	1	1	;	1	1800
Benzene	71-43-2	0.2	2	2300	46	:	1	1	:	:	1.4	8
Bromodichloromethane	75-27-4	5	40	11000	1	ł	I	1	1	1	1.3	40
Bromoform	75-25-2	0.5	40	23000	320	I	ł	1	2900000	580000	9.9	40
Bromomethane	74-83-9	- 0	140 20	1	1	:	ł	ł	:	:	1	2.8
Carbon I etrachloride	56-23-5 108 00 7	0.2	70	180	9.8	1	1	:	1	:	1.1	× 4
	1-06-001	7:0	40	- 00	4/	1	1	1	:	:	1 2	40 00
Cnlorolorm Chloromathana	0/-00-2 71-87-3	0.2	100	490	1.0		1			:	C.2	70
Cimene	98-82-8	0.5	2			1	1	1	1	1	1	200
Cvclohexane	110-82-7	10	100	:	:	;	1	1	;	;	1	
Dibromo-3-chloropropane, 1,2-	96-12-8	7	10	:	;	1	1	1	1	1	0.031	0.4
Dibromochloromethane	124-48-1	1	20	11000	;	1	1	1	27000	580000	0.93	40
Dibromoethane, 1,2-	106-93-4	0.2	16	1	1	ł	I	ł	ł	1	0.039	18
Dibromomethane (Methylene Bromide)	74-95-3	0.2	09	11000	1	:	1	1	27000	:	1	20
Dichlorobenzene, 1,2-	95-50-1	0.3	40	260	0.7	:	1	1	:	;	1 2	180
Dichlorodifluoromethane	75-71-8	0.4	40	100	t: 1				1		ţ.	400
Dichloroethane, 1,1-	75-34-3	0.2	40	830	47	1	1	:	1	;	14	400
Dichloroethane, 1,2-	107-06-2	0.2	16	8800	100	:	-	1	:	:	0.86	12
Dichloroethylene, 1,1-	75-35-4	0.1	20	450	25	ł	ł	ł	ł	1	1	100
Dichloroethylene, 1,2-cis-	156-59-2	0.2	2	11000	590	:	1	1	:	:	1	4
Dichloroethylene, 1,2-trans-	156-60-5	0.2	40	11600	1160	ł	1	1	1	;	I	40
Dichloropropane, 1,2-	78-87-5	0.2	2	23000	5700	:	ł	1	:	:	2.2	180
Ethyl Chloride	75-00-3	5	2	;	1	I	ł	1	1	:	1	I
Ethylbenzene	100-41-4	0.2	5	130	7.3	ł	1	1	ł	1	7.1	200
Hexanone, 2-	591-78-6	20	60	1800	66	:	1	1	:	:	1	10
Methyl Acetate	70 02 2	C.U	00			1	1	1	1	;	1	2000
Methyl Euryl Neture (z-Dutanolic) Methyl tert-Butyl Ether (MTRF)	1634-04-4	1	90 ¢		10000				: :	: :	- 73	1200
Methylene Chloride	75-09-2	- <b>S</b>	25	26000	98.1	:	;	;	:	:	6 2	12
	1-12-11	,	ý	70007	1.0/	1	I		1	l	51	1

Values	
Criteria	
e 4-1	
Table	

		Laborato	ratory	NOAA SQuiRT Freshwater Surface Water	NOAA SQuiRT Freshwater Surface Water	NOAA SQuiRT Freshwater Sediment	NOAA SQuiRT shwater Sedim	T nent				
		Reportir	Reporting Limits	(ng/L)	/ <b>L</b> )	ôn)	(ng/Kg)			<b>EPA Residential RSLs</b>	ntial RSLs	
										Noncancer Child		Noncancer Child
			Soil/Sedi-						Carcinogenic Target Risk - Soil Dermal	Hazard Index - Soil Dermal	Carcinogenic Target Risk - Tap Water	Hazard Index - Tap Water
Analyte Name	CAS Number	Water (ug/L)	ment (ug/Kg)	Acute	Chronic	Chronic ARCS TEL	TEL	PEL	Contact (ug/Kg)	Contact (ug/Kg)	Ingestion (ug/L)	Ingestion (ug/L)
Styrene	100-42-5	Ś	40	:	32	1	;	;	ł	ł	ł	400
Tetrachloroethane, 1,1,2,2-	79-34-5	1	40	2100	111	ł	1	1	1	1	0.39	40
Tetrachloroethylene	127-18-4	ε	20	830	45	1	1	1	1	;	37	12
Toluene	108-88-3	7	40	120	9.8	1	1	1	1	;	1	160
Trichlorobenzene, 1,2,3-	87-61-6	7	40	:	8	1	1	1	1	23000	1	1.6
Trichlorobenzene, 1,2,4-	120-82-1	1	40	70	24	1	1	1	ł	;	2.7	20
Trichloroethane, 1,1,1-	71-55-6	3	40	200	11	-	1	1	-	-	-	4000
Trichloroethane, 1,1,2-	79-00-5	1	12	5200	500	1	1	1	1	:	1.4	∞
Trichloroethylene	79-01-6	3	2	<440	<21	-	1	1	1	-	1.2	1
Vinyl Chloride	75-01-4	1	16	:	930	1	1	1	1	;	0.021	9
Xylene, m,p-	-CZ-1006/1	1	2	-	-		ł	1			-	400
Xylene, o-	95-47-6	3	2	:	350		1	1	1	-	1	400
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5	60	:	:	-	1	1	1	-	1	6000
1,3-Dichlorobenzene	541-73-1	0.3	2	630	38	-	1	1	1	-	1	1
1,4-Dioxane	123-91-1	5	60	:	:	-	1	1	23000	870000	0.78	60
4-Methyl-2-pentanone	108-10-1	15	60	2200	170	-	1	1	-		1	160
Methylcyclohexane	108-87-2	5	60	1	1	-	1	:	-	-	1	1
trans-1,3-Dichloropropene	10061-02-6	1	10	0.99	0.055	-	1	1	1	-	1	1
Trichlorofluoromethane	75-69-4	3	40	11000	:	1	1	1	1	:	1	600
Note:												

a Value provided is for lead acetate.

Key:

-- = No associated cleanup level ARCS = Assessment and Remediation of Contaminated Sediments CAS = Chemical Abstracts Service EPA = United States Environmental Protection Agency

NA= Noi applicable NOAA = National Occanic and Atmospheric Administration PEL = Probable Effects Level RSL = Regional Screening Level SQuiRT = Screening Quick Reference Tables TEL = Threshold Effects Level ugK g = Micrograms per kilogram ug/L = Micrograms per liter

Table 4-2 Sample Co	Sample Collection Summary	ary										
EPA Sample Number	Sample Location Number	Date	Time	Depth (inches bgs)	Sampler	slataM	vocs	PCBs	Pesticides/PAHs	0220	 פאס	Description
Sediment Samples												
15244101	BL01SD	6/17/2015	9:40	0-6	START	Х	×	X	×	×	Fine samp X wet, i	Fine sult collected for GRO and VOC aliquots, remaining sample aliquots are of dark grey, gravelly, silty material, wet, no odor. MS/MSD.
15244102	BL02SD	6/17/2015	10:17	0-6	START	X	×	×	×	×		Gravel with some organics and very fine sediment, wet, no odor.
15244103	BL03SD	6/17/2015	11:30	0-6	START	Х	×	×	×	×	X Dark	Dark brown, silt with organics and rocks, wet, no odor.
15244104	BL04SD	6/17/2015	12:10	9-0	START	Х	×	×	×	×	Dark X odor.	Dark brown, fine silt with organics and rocks, wet, no odor.
15244105	BL05SD	6/17/2015	4:30	9-0	START	Х	×	×	×	×	X Samp	Sample not described.
Surface Water Samples	nples											
15244116	BL01SW	6/17/2015	2:40	1	START	Х	Х	Х	×	X	X Co-lc	Co-located with BL01SD. Mildly cloudy, no odor.
15244117	BL02SW	6/17/2015	3:10	;	START	Х	X	X	×	X	X Co-lc	Co-located with BL02SD. Slightly turbid, no odor.
15244119	BL04SW	6/17/2015	3:15	1	START	Х	×	×	×	×	X Co-lc	Co-located with BL04SD. Mildly turbid, no odor.
15244120	BL05SW	6/18/2015	12:30	1	START	Х	X	×	×	×	X MS/MSD	Co-located with BL05SD. Mildly cloudy, no odor. MS/MSD.
15244121	BL06SW	6/17/2015	2:40	:	START	Х	×	×	×	×	X South	South side of Big Lake.
15244122	BL07SW	6/17/2015	3:35	1	START	Х	X	×	×	×	X South	South side of Big Lake.
15244118	BL08SW	6/17/2015	4:00	1	START	Х	×	×	×	×	X South	Southwest end of Big Lake.
QA/QC Samples												
15244123	TB01WT	6/17/2015	2:00	1	START	1	×	ł	1	1	X Trip l	Trip blank.
15244124	TB02WT	6/17/2015	2:10	1	START	ł	×	ł	1	1	X Trip1	Trip blank.
15244114	TB01SD	NP	NP	-	Test America	1	1	ł	1	1	X Trip l	Trip blank.
Key:												
	= Not anlayzed				NP =	Not p	NP = Not provided	Ч				
pgs =	bgs = below ground surface	ace			PAHs = Polycyclic aromatic hydrocarbons	Polyc	yclic a	romat	ic hyd	rocarbo	Suc	
DRO=	DRO = Diesel range organics	nics			PCBs = Polychlorinated biphenyls	Polyc	hlorina	ated bi	pheny	ls		
	; ;	•			() 							

VOCs = Volatile organic compounds

RRO = Residual range organics

EPA = United States Environmental protection agency

GRO = Gasoline range organics MS/MSD = Matrix spike/matrix spike duplicate

I able 4-3	Sample Coding		
Digits	Description	Code	Example
1,2	Source Code	BL	Big Lake
		TB	Trip Blank
3,4	Consecutive Number	01	First number of source code
5,6	Matrix Code	SD	Sediment
		SW	Surface Water
		WT	Water

### Table 4-3 Sample Coding

Table 4-4 Frequency of Cr	y of Criteria Value	riteria Value Exceedances			
	Range of Detected	Frequency of	Frequency of Exceedance of Criteria	Criteria Value	
Analyte	Concentrations	Detection	Values	Source	<b>Criteria Value</b>
Sediment	1		1		
Metals (mg/kg)					
Arsenic	5.5 - 11	5/5	5/5	а	5.1
Cadmium	0.31 - 0.6	3/5	1/5	q	0.583
Copper	35 J – 50 J	5/5	5/5	q	28.012
Manganese	890 - 1500	5/5	5/5	q	630
Nickel	22 - 37	5/5	5/5	q	18
Zinc	75 - 100	5/5	1/5	þ	98
Polycyclic Aromatic Hydrocarbons (μg/kg)	lydrocarbons (µg/kg)				
Benzo(a)anthracene	21 J	1/5	1/5	q	15.72
Fluoranthene	48 J	1/5	1/5	þ	31.46
<b>Surface Water</b>					
Metals (mg/L)					
Barium	0.011 - 0.013	L/L	L/L	С	0.0039
Notes: a- EPA Residential R	EPA Residential RSL Carcinogenic Target Risk – Soil Dermal Contact.	sk – Soil Dermal Contact.			

b- NOAA SQuIRT Freshwater Sediment ARCS TEL.
 c- NOAA SQuIRT Freshwater Surface Water.

# Key:

			of Contaminated Sediments.	rotection Agency.	The associated numerical value is an estimated quantity because the reported concentration is less than the sample quantitation limit or because quality	met.	teric Administration.		bles.
<ul> <li>milligrams per kilogram.</li> </ul>	= milligrams per liter.	<ul> <li>micrograms per kilogram.</li> </ul>	= Assessment and Remediation of Contaminated Sediments	= United States Environmental Protection Agency.	= The associated numerical value is an estimated q	control criteria limits were not met.	= National Oceanic and Atmospheric Administration.	<ul> <li>Regional Screening Level.</li> </ul>	= Screening Quick Reference Tables.
 mg/kg	mg/L	μg/kg	ARCS	EPA	J		NOAA	RSL	SQuiRT

Table 4-5 Sediment Analytical Sample Results Su	e Results Summary	۲۷				
EPA Sample ID Station I ocation Description	Applicable Criteria	15244101 BL01SD	15244102 BL 02SD	15244103 BL 03SD	15244104 BL 04SD	15244105 BL 05SD
Sample Depth (inches)	Value	9-0	9-0	9-0	9-0	9-0
Petroleum Products (mg/kg)						
Diesel Range Organics	:	27 U	37 J	36 JQ	230 J	300 J
Residual Range Organics	-	63 JQ	170 J	81 JQ	f 066	2000 J
Gasoline Range Organics	-	1.5 JQ	2.6 JQ	13 U	41 U	23 U
Metals (mg/kg)						
Aluminum	$25500^{a}$	14000	11000	12000	9006	9800
Antimony	-	0.29	0.26	0.32	0.47 JQ	0.49
Arsenic	$5.1^{b}$	<u>9.9</u>	<u>11</u>	<u>10</u>	<u>5.5</u>	<u>6.2</u>
Barium	-	110	71	84	91	95
Beryllium	-	0.74	0.45	0.49	0.4 JQ	0.45
Cadmium	$0.583^{a}$	<u>0.6</u>	0.35	0.31	0.43 JQ	0.39 JQ
Calcium	-	9700 J	4300 J	4100 J	7200 J	7000 J
Chromium	$36.826^{a}$	35	28	26	18	19
Cobalt	-	20	15	16	10	13
Copper	28.012 <sup>a</sup>	<u>50 J</u>	<u>39 J</u>	<u>48 J</u>	<u>35 J</u>	<u>35 J</u>
Iron	$188400^a$	32000	30000 J	31000	22000	25000
Lead	8.1 <sup>b</sup>	7.1	6.4	6.3	5.6	7.2
Magnesium	-	8500	7500	7200	5200	5200
Manganese	$630^{a}$	<u>1500</u>	<u>1100</u>	<u>910</u>	<u>920</u>	<u>890</u>
Mercury	$0.174^{\rm c}$	0.052	0.018 JQ	0.055	0.047 JQ	0.075
Nickel	$18^{a}$	<u>37</u>	<u>28</u>	<u>31</u>	<u>22</u>	<u>24</u>
Potassium	;	820	580	760	780	920
Silver	;	0.092 JQ	0.089 JQ	0.068 JQ	0.087 JQ	0.067 JQ
Sodium	-	120	70 JQ	78 JQ	320 U	97 JQ
Vanadium	:	60	48	43	39	38
Zinc	$98^{a}$	<u>100</u>	75	79	76	75

Stable       15.         1.5. $00^{0}$ $0.0^{-1}$ 0 $0^{0}$ $0^{-1}$ $0.0^{-1}$ 0 $0^{0}$ $0^{0}$ $0.0^{-1}$ $2^{2}$ $a^{-1}$ $a^{-1}$ $2^{-1}$ $2^{2}$ $a^{-1}$ $2^{-1}$ $2^{-1}$ $0^{0}$ $0^{0}$ $0^{0}$ $0^{-1}$	able e a o	15244102 BL02SD 0-6	15244103 BL 03SD	15244104	15244105
Value 810000 <sup>b</sup> 810000 <sup>b</sup> 810000 <sup>b</sup> 810000 <sup>b</sup> 9 <b>/kg)</b> 6.71° 15.72 <sup>a</sup> 31.9° 570 <sup>b</sup> 570 <sup>b</sup> 570 <sup>b</sup> 570 <sup>b</sup> 570 <sup>b</sup> 31.9° 31.9° 17.32 <sup>a</sup> 26.83 <sup>a</sup> 6.22° 31.46 <sup>a</sup> 17.32 <sup>a</sup> 44.27 <sup>a</sup> 23.000 <sup>d</sup> 44.27 <sup>a</sup> 44.27 <sup>a</sup> 44.27 <sup>a</sup>		0-6			DI DECD
810000 <sup>b</sup> <b>g/kg)</b>  6.71 <sup>c</sup> 10 <sup>a</sup> 15.72 <sup>a</sup> 31.9 <sup>c</sup> 570 <sup>b</sup> 570 <sup>b</sup> 570 <sup>b</sup> 31.46 <sup>a</sup> 10 <sup>a</sup> 10 <sup>a</sup> 10 <sup>a</sup> 10 <sup>a</sup> 10 <sup>a</sup> 10 <sup>a</sup> 27.2 <sup>a</sup> 10 <sup>a</sup> 23000 <sup>d</sup>  			9-0	0-6	DL032U 0-6
810000 <sup>b</sup> g/kg)  $6.71^{c}$ $10^{a}$ $15.72^{a}$ $31.9^{c}$ $570^{b}$ $570^{b}$  $27.2^{a}$ $26.83^{a}$ $6.22^{c}$ $10^{a}$ $17.32^{a}$ $17.32^{a}$ $2.7.2^{a}$ $2.6.83^{a}$ $2.7.2^{a}$					
g/kg) 6.71° 10 <sup>a</sup> 15.72 <sup>a</sup> 31.9° 570 <sup>b</sup> 570 <sup>b</sup> 27.2 <sup>a</sup> 26.83 <sup>a</sup> 6.22° 6.22° 17.32 <sup>a</sup> 17.32 <sup>a</sup> 17.32 <sup>a</sup> 44.27 <sup>a</sup> 44.27 <sup>a</sup>		0.013 U	0.02 U	0.044 U	0.027 U
$\begin{array}{c cccc} - & - & - & \\ 6.71^{c} & 10^{a} & \\ 15.72^{a} & 570^{b} & \\ 31.9^{c} & 570^{b} & \\ & 26.83^{a} & \\ 26.83^{a} & \\ 26.83^{a} & \\ 31.46^{a} & \\ 10^{a} & \\ 17.32^{a} & \\ 17.32^{a} & \\ 17.32^{a} & \\ 23000^{d} & \\ $					
$\begin{array}{c c} 6.71^{c} & \\ 10^{a} & \\ 10^{a} & \\ 15.72^{a} & \\ 31.9^{c} & \\ 570^{b} & \\ 570^{b} & \\ 2.7.2^{a} & \\ 2.7.2^{a} & \\ 2.2.2^{c} & \\ 2.2.2^{c} & \\ 2.2.2^{c} & \\ 1.1.32^{a} & \\ 2.2.2^{c} & \\ 1.1.32^{c} & \\ 1.1.32^$		6.4 U	2.6 JQ	22 U	13 U
$\begin{array}{c cccc} 10^{a} & \\ 15.72^{a} & \\ 31.9^{c} & \\ 570^{b} & \\ 570^{b} & \\ 26.83^{a} & \\ 17.32^{a} & \\ 23000^{d} & \\ 23000^{d} & \\ -1 & $		6.4 U	9.7 U	22 U	13 U
$\begin{array}{c cccc} 15.72^{a} & \\ \hline 31.9^{c} & \\ 570^{b} & \\ \hline - & \\ - & \\ 26.83^{a} & \\ 10^{a} & \\ 110^{a} & \\ 10^{a} & \\ 10^{a} & \\ 110^{a} & \\ 110^{a} & \\ 110^{a} & \\ 110^{a} & \\ 23000^{d} & \\ - & \\ - & \\ 23000^{d} & \\ - & \\ $		01.99 JQ	9.7 U	22 U	13 U
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		13 U	19 U	45 U	27 U
$\begin{array}{c cccc} 570^{b} & & \\ \hline & & \\ \hline & & \\ 26.83^{a} & & \\ 26.83^{a} & & \\ 26.83^{a} & & \\ \hline & & \\ 26.83^{a} & & \\ \hline & & \\ 6.22^{c} & & \\ \hline & & \\ 31.46^{a} & & \\ \hline & & \\ 31.46^{a} & & \\ \hline & & \\ 17.32^{a} & & \\ 17.32^{a} & & \\ \hline & & \\ 23000^{d} & & \\ \hline & & \\ 23000^{d} & & \\ \hline & & \\ \hline & & \\ 23000^{d} & & \\ \hline \end{array}$		6.4 U	9.7 U	22 U	13 U
$\begin{array}{c cccc} - & - & - & - & - & - & - & - & - & - $		2.2 JQ	19 U	45 U	27 U
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		13 U	19 U	45 U	27 U
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		13 U	19 U	45 U	27 U
$\begin{array}{c c} 6.22^{c} \\ \hline 31.46^{a} \\ 10^{a} \\ \hline 17.32^{a} \\ \\ 44.27^{a} \\ \hline 44.27^{a} \\ 23000^{d} \\ \\ \\ \\ \\ \\ \\ \\ $		2.7 JQ	9.7 U	22 U	13 U
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		6.4 U	9.7 U	22 U	13 U
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		2.6 JQ	2 JQ	4.9 JQ	2.4 JQ
17.32 <sup>a</sup>  44.27 <sup>a</sup> 23000 <sup>d</sup> 23000 <sup>d</sup>   		0.86 JQ	9.7 U	22 U	13 U
 44.27 <sup>a</sup> 23000 <sup>d</sup>    		6.4 U	9.7 U	22 U	13 U
44.27 <sup>a</sup> 23000 <sup>d</sup>     		4.9 JQ	11 JQ	32 JQ	7.6 JQ
23000 <sup>d</sup>    		3 JQ	3.8 JQ	9.6 JQ	4.7 JQ
zene 23000 <sup>d</sup> zene 23000 <sup>d</sup> zene 2200 zene 2200 zene 2200 zene 2200 zene 2200 zene 2200 zene 2000 zene 20000 zene 2000	(ba)br				
zene zene zene		22 JQ	130 U	410 U	230 U
zene	66 U	13 JQ	130 U	410 U	230 U
oropropane zene		73 U	130 U	410 U	230 U
zene		16 JQ	660 U	2000 U	1100 U
		73 U	130 U	410 U	230 U
		22 JQ	52 JQ	410 U	120 JQ
1	19 JQ	73 U	130 U	410 U	230 U
Methylene Chloride 41 U		46 U	83 U	220 JQ	0f 89
m-Xylene & p-Xylene 75		73 U	130 U	410 U	230 U

I able 4-0 Sequinent Analy incar Sample Resards Sammary		ar y				
EPA Sample ID Station Location Description Sample Depth (inches)	Applicable Criteria Value	15244101 BL01SD 0-6	15244102 BL02SD 0-6	15244103 BL03SD 0-6	15244104 BL04SD 0-6	15244105 BL05SD 0-6
n-Butylbenzene	-	14 JQ	73 U	130 U	410 U	230 U
N-Propylbenzene	-	9.9 JQ	73 U	130 U	410 U	230 U
o-Xylene	-	46 JQ	73 U	130 U	410 U	230 U
Toluene	-	35 JQ	150	32 JQ	250 JQ	83 JQ
trans-1,2-Dichloroethene	1	8.9 JQ	21 JQ	130 U	410 U	24 JQ

Table 4-5 Sediment Analytical Sample Results Summary

Notes:

- a NOAA SQuiRT Freshwater Sediment ARCS TEL.
- b EPA Residential RSL Carcinogenic Target Risk Soil Dermal Contact.
- c NOAA SQuiRT Freshwater Sediment TEL
- d EPA Residential RSL Noncancer Child Hazard Index Soil Dermal Contact.
- Bold type indicates the sample result is above the Reporting Limit.

Shaded cell with underlined and bolded type designates value above applicable cleanup standard.

Key:

- -- = Not Available
- $\mu g/kg = micrograms per kilogram$
- mg/kg = milligrams per kilogram.
- ARCS = Assessment and Remediation of Contaminated Sediments
- EPA = United States Environmental Protection Agency.
- ID = Identification.
- J = The associated numerical value is an estimated quantity because the reported concentration is less than the sample quantitation limit or because quality control criteria limits were not met.
- NOAA = National Oceanic and Atmospheric Administration
- Q = Detected concentration is below the method reporting limit but is above the method quantitation limit.
- RSL = Regional Screening Level
- SQuiRT = Screening Quick Reference Tables
- TEL = Threshold Effects Level
- U = The analyte was not detected at or above the reported value.

Table 4-6 Surface Water Analytical Sample Results Summary	ample Results Summ	ary						
EPA Sample ID	Applicable	15244116	15244117	15244119	15244120	15244121	15244122	15244118
Station Location Description	<b>Criteria Value</b>	BL01SW	BL02SW	BL04SW	<b>BL05SW</b>	BL06SW	BL07SW	BL08SW
Petroleum Products (mg/L)								
Diesel Range Organics	:	0.075 JQ	0.088 JQ	0.06 JQ	0.059 JQ	0.094 JQ	0.07 JQ	0.063 JQ
Residual Range Organics	1	0.054 JQ	0.11	0.082 JQ	0.062 JQ	0.11	0.11	0.09 JQ
Metals (mg/L)								
Barium	$0.0039^{a}$	0.012	0.012	0.013	<u>0.012</u>	0.012	0.012	0.011
Calcium	1	15	16	15	15	15	15	15
Iron	$1^{a}$	0.5 U	0.5 U	0.5 U	0.5 U	019 JQ	0.5 U	0.5 U
Lead	$0.00025^{a}$	0.002 U	0.002 U	0.00022 JQ	0.00033 JQ	0.002 U	0.002 U	0.002 U
Magnesium	-	1.8	1.9	1.8	1.8	1.8	1.9	1.8
Manganese	$0.048^{\mathrm{b}}$	0.019	0.02	0.027	0.022	0.043	0.021	0.022
Potassium	-	2 JQ	2.1 JQ	2 JQ	2 JQ	2 JQ	2.1 JQ	2 JQ
Silver	$0.00036^{a}$	0.002 U	0.002 U	0.002 U	0.002 U	0.00036 JQ	0.00025 JQ	0.002 U
Sodium	-	1 JQ	1.1 JQ	1 JQ	1 JQ	1 JQ	1.1 JQ	1.1 JQ
Zinc	$0.12^{a}$	0.035 U	0.015 JQ	0.022 JQ	0.021 JQ	0.035 U	0.035 U	0.035 U
Semivolatile Organic Compounds (µg/L)	ls (µg/L)							
Chrysene	3.4 <sup>c</sup>	0.021 U	0.02 U	0.02 U	0.019 U	0.0057 JQ	0.019 U	0.019 U

Table 4-6 Surface Water Analytical Sample Results Summary

Notes:

a NOAA SQuiRT Freshwater Surface Water - Chronic

b EPA Residential RSL Noncancer Child Hazard Index - Tap Water

c EPA Residential RSL Carcinogenic Target Risk - Tap Water

Bold type indicates the sample result is above the Reporting Limit.

Shaded cell with underlined and bolded type designates value above applicable cleanup standard.

## Key:

-- = Not Available

 $\mu g/L = micrograms per liter$ 

EPA = United States Environmental Protection Agency

ID = Identification.

J = The associated numerical value is an estimated quantity because the reported concentration is less than the sample quantitation limit or because quality control criteria limits were not met.

mg/L = milligrams per liter

NOAA = National Oceanic and Atmospheric Adiministration.

Q = Detected concentration is below the method reporting limit but is above the method quantitation limit.

RSL = Regional Screening Level

SQuiRT = Screening Quick Reference Tables

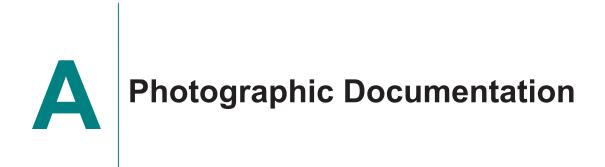
U = The analyte was not detected at or above the reported value.

Cleanup Option	Rationale
<b>Option 1</b> – Removal of drums and containers from lake. Disposal off- site as hazardous waste.	In this removal alternative, the drums and other containers will be removed from the lake and placed into overpack drums, and transported to a hazardous waste treatment, storage, and disposal facility pending transportation for permanent disposal. The contents of the containers will be sampled in order to characterize the material and establish a waste profile for disposal. Waste will be disposed as hazardous waste at a Subtitle C landfill.
<b>Option 2</b> – Removal of drums and containers from lake. Disposal off- site as non-hazardous waste.	In this removal alternative, the drums and other containers will be removed from the lake and placed into overpack drums, and transported to a hazardous waste treatment, storage, and disposal facility pending transportation for permanent disposal. The contents of the containers will be sampled in order to characterize the material and establish a waste profile for disposal. Waste will be disposed as non-hazardous waste at a Subtitle D landfill.

#### Table 5-1 Cleanup Options and Rationale

Cleanup Option	Description	Estimated Cost
Option 1	Excavation and Backfill of Contaminated Soil	\$37,640
-	Laboratory Analyses and Disposal	\$4,450
	Removal Oversight	\$5,010
	Subtotal	\$47,100
	Indirect Costs – Design, Project Management, Construction Management	\$3,250
	Removal Contingency (+15%)	\$7,065
	Total (rounded to nearest \$1,000)	\$57,000
Option 2	Excavation and Backfill of Contaminated Soil	\$37,640
	Laboratory Analyses and Disposal	\$3,380
	Removal Oversight	\$5,010
	Subtotal	\$46,030
	Indirect Costs – Design, Project Management, Construction Management	\$3,176
	Construction Contingency (+10%)	\$6,905
	Total (rounded to nearest \$1,000)	\$56,000

## Table 5-2 Cleanup Options Preliminary Cost Estimates



BIG LAKE TARGETED BROWNFIELDS ASSESSMENT

Holy Cross, Alaska



Photo 1 Wood debris in north end of Big Lake.

Time: 09:31	
Date: 6/17/15	
irection: East	
Dire	





Photo 2 Wood debris in north end of Big Lake.



Date: 6/17/15 Time: 09:32

Time: 10:00

Date: 6/17/15

Direction: East

Direction: South

**BIG LAKE TARGETED BROWNFIELDS ASSESSMENT** Holy Cross, Alaska

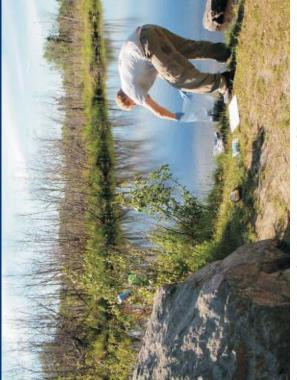


Photo 5 Location of sediment sample BL01SD.

Time: 10:05	
Date: 6/17/15	
it	
East	
Direction:	





Sample BL02SD. Photo 6

Direction: Southeast



Time: 10:50

Date: 6/17/15



Direction: Southeast

Time: 10:50

Date: 6/17/15

Direction: Southeast

Sample BL03SD.

Photo 8

Time: 11:30

Date: 6/17/15

**BIG LAKE TARGETED BROWNFIELDS ASSESMENT** 

Holy Cross, Alaska



Location of sediment sample BL03SD. Note 5-gallon orange Time: 11:30 bucket in view. Bucket is empty. Direction: Southeast Photo 9

Date: 6/17/15





Photo 10 Sample BL04SD.





Time: 14:37 Date: 6/17/15 Direction: South

Time: 14:44

Date: 6/17/15

Direction: East

BIG LAKE TARGETED BROWNFIELDS ASSESSMENT



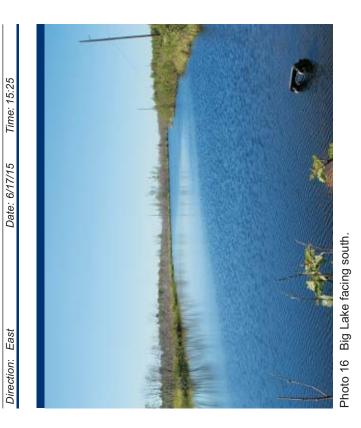
Photo 13 Sample BL06SW.

Time: 14:49	
Date: 6/17/15	
East	
Direction:	





Photo 14 Sample BL04SW.



Direction: South

Time: 16:31

Date: 6/17/15

Direction: South

Time: 12:37

Date: 6/18/15

BIG LAKE TARGETED BROWNFIELDS ASSESSMENT

Holy Cross, Alaska

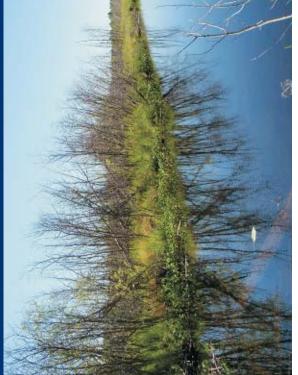
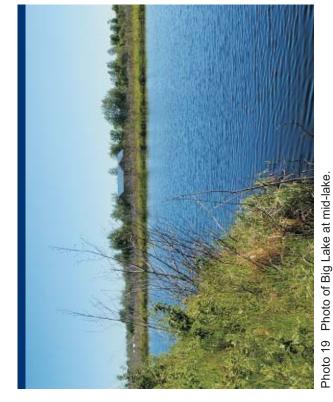


Photo 17 Big Lake facing southwest and showing marshy edge of lake.

Time: 12:38	
Date: 6/18/15	
Southeast	
Direction:	



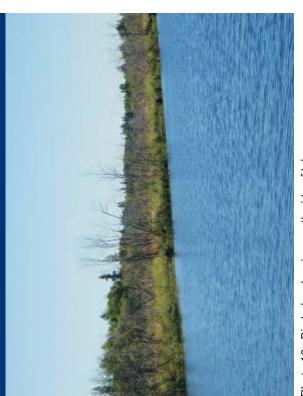
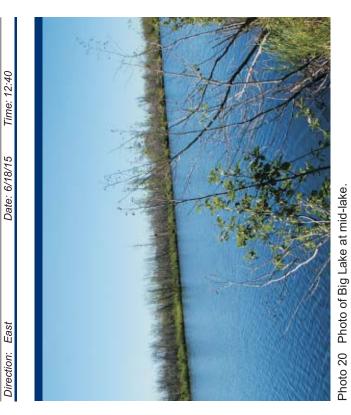


Photo 18 Big Lake showing south side of lake.



Date: 6/18/15 Time: 12:44

Direction: Northeast

Time: 12:44

Date: 6/18/15

Direction: Southeast

BIG LAKE TARGETED BROWNFIELDS ASSESSMENT Holy Cross, Alaska



Photo of rusted 55-gallon drum on southwest shore of Big Lake. Time: 12:48 Date: 6/18/15 Direction: Northeast Photo 21

TDD Number: 14-08-0001 Photographed by: Linda Ader



Photo 22 View of Big Lake from south end of lake.

Time: 12:48	
Date: 6/18/15	
Northeast	
Direction:	



#### SAMPLE PLAN ALTERATION FORM Project Name and Number: Holy Cross, AK – Big Lake TDD 14-08-0001

#### Material to be Sampled:

Surface sediment from Big Lake

#### **Measurement Parameters:**

Collect surface sediment using stainless steel spoons and bowls for VOCs, GRO, DRO/RRO, PCBs, pesticides, metals, and PAHs analysis.

#### Standard Procedure for Field Collection and Laboratory Analysis (cite references):

Aquatic sediment sampling (E & E SOP ENV 3.8) and laboratory analysis for VOCs, GRO, DRO/RRO, PCBs, pesticides, metals, and PAHs [E & E Sampling and Quality Assurance Plan for the Holy Cross, AK - Big Lake, June 2015].

#### Reason for Change in Field Procedure or Analytical Variation:

The sampling plan called for sampling a total of 13 sediment locations. A site visit was not performed prior to field work due to the remote location of the site. During the field event, it was determined that proposed locations on the south side of the lake could not be accessed on foot due to marshy conditions on that side of the lake had no shore (marshy grasses in ~3 feet of water constituted that shoreline), it was not possible to use the available raft to sample these areas.

In addition, the bank on north side of the lake along the road primarily consisted of steeply-sloped rock rubble with very little sediment. For this reason, sufficient sample material to allow analysis of the full proposed analytical suite was not available. The laboratory was instructed to prioritize analysis of material in 8-oz jars as follows until all available sample material had been used: PAHs, metals, PCBs, pesticides, then DRO/RRO. All VOC aliquots were collected. At some sample points, GRO aliquots could not be collected.

#### Variation from Field or Analytical Procedure:

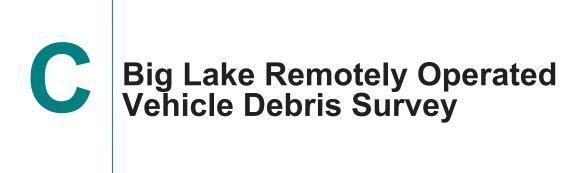
Only 5 of 13 proposed sediment samples were collected. A reduced analytical suite will be applied to most samples.

#### Special Equipment, Materials, or Personnel Required:

None.

CONTACT	APPROVED SIGNATURE	DATE
Initiator: Linda Ader	Lends & Ader	7/1/2015
START TL: Linda Ader	Lenda & Adar	7/1/2015
EPA TM: Brandon Perkins	Barlow the	7/1/2015
EPA QA Manager : Vacant	Sunffagl	07/07/2015

Page 1 of 1



## Big Lake Remotely Operated Vehicle Debris Survey

## Holy Cross, Alaska

## June 2015



**Prepared for:** 



720 Third Avenue, Ste 1700

Seattle, WA 98104

Prepared by:



180 E Hygrade Ln

Wasilla, AK 99654

#### Introduction:

A remotely operated vehicle (ROV) survey was conducted at Big Lake in Holy Cross, Alaska from 16-17 June 2015. The intent of the survey was to search for underwater debris and determine the depth profile of the lake to aid in potential future cleanup and restoration efforts. Big Lake appears to have been partially filled along part of the western shore and northern edge and is a known dump site for various forms of debris in the community over the past several decades. Gaining insight into the extent of debris and the depth at which it is located is useful for future cleanup plans while understanding the depth profile assists in both future sampling and cleanup plans.

#### Methods:

A VideoRay Pro 4 ROV was used to conduct the visual survey. Seven transects were established across the lake and are shown in figure 1. Video was gathered along the entire length of the transect and still images were taken when necessary to document debris. The ROV was operated within visual distance of the bottom and followed an internal compass heading to fly a route to the far shore. Upon reaching the far shore, the ROV was brought to the surface and pulled back to the start location by its tether. A GoPro Hero 3 external high definition (HD) camera was attached to the ROV on the first day in order to gather HD imagery, but this technique was discontinued on the second day due to poor video footage given the exceptionally low water clarity.

Depth was determined by a portable depth sounder attached to a small raft. Depths were recorded at various distances from shore at each transect and at locations off-transect at the southern end of the lake using a laser range finder. Depths are presented in figures 2 through 4.

#### **Results and Discussion:**

The poor water clarity was the major limiting factor for the ROV surveys. This lack of clarity was likely due to dense aggregations of phytoplankton in the water column due to the time of year. The water clarity actually appeared quite good from surface observations as there was no sign of turbidity due to suspended sediment from surface runoff. ROV video in very shallow depths was decent, but it degraded rapidly after the first few feet and was near zero at bottom depths of six to twelve feet. At these depths, visibility was approximately 12-18 inches and it was often difficult to distinguish the bottom at all due to the lack of contrast with the color of the water. In fact, in many instances the bottom was detected by accidentally slamming the ROV into it and at one point this impact damaged a portion of the ROV where the manipulator and skids are attached. Attempts to improve the video quality by using the lights at various levels from 0 to 100% made only minor differences in overall video quality. Based on work in other areas of Alaska during phytoplankton blooms, it is often possible to get decent video below the photic zone. This results in working in complete blackout conditions where lights are used, but the video footage is typically much better when the influence of the sun passing through the water column is removed. Unfortunately, the depths at Big Lake were all in the photic zone and visibility was poor on all transects. A survey in early spring or fall would likely allow for the best water clarity.

Despite the poor water clarity, debris was observed along transects A and B. Locations and descriptions of the debris in these areas are provided in figures 5 through 10. Debris at the southern end of Big Lake was observed from a raft both on the shoreline (one drum) and in shallow water and is shown in figure 11.

The process for gathering depth data worked well and results are presented in figures 2 through 4. Prior to this survey, there was no idea of the depth of the lake. Because of this, the sort of recovery techniques that could be used for removing debris could not be determined. While it is possible that some deeper spots may exist, it seems unlikely that they would be more than a foot or two deeper than the maximum depth of 12 feet recorded on sonar for this survey. The depth profile along much of the western shore of Big Lake indicated that it was likely filled in the past.

Video files from the ROV for all of the transects are located on the flash drive included with this report. Questions can be directed to Chris Hoffman at 907-354-3132 or <u>Chris@hightidealaska.com</u>.





Figure 1. Transects A-G with start locations (at the letters) and approximate track and end locations. Transect A had a side portion to cover the shallow end of the lake where debris was noted from shoreline observations.



Figure 2. Overall image of Big Lake depths.



Figure 3. Close up view of depths at the north end of Big Lake.



Figure 4. Close up view of depths at the central and southern portions of Big Lake.

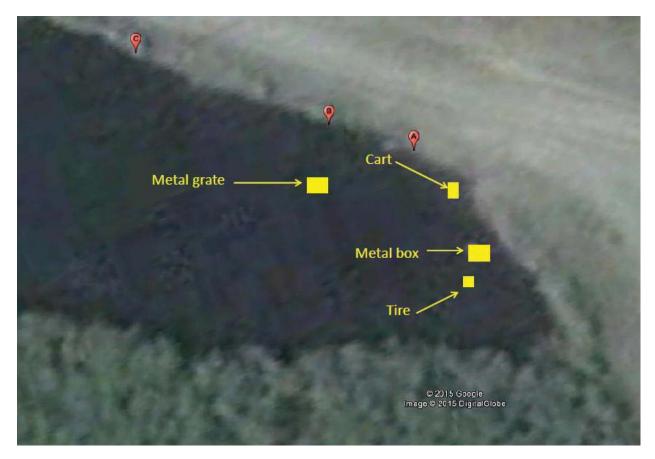


Figure 5. Debris at the north end of the lake. The metal grate was located on transect B while the rest was located on a side portion of transect A or from a shoreline survey.



Figure 6. Submerged cart.

6/16/2015 10:00:50 AM



Figure 7. Tire.



Transect 8. Top of large metal box, roughly 4 feet by four feet.



Transect 9. Unidentified object (bottom left) at the north end of the lake.



Figure 10. Metal grate along transect B. Size is estimated to be roughly 3 feet by 6 feet.



Figure 11. Debris at the south end of Big Lake as noted by a shoreline survey on a raft.



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# Appendix D - Global Positioning System Sample Coordinates

Sample Location	Latitude	Longitude
BL01SD/BL01SW	62.195114	-159.774411
BL02SD/BL02SW	62.194785	-159.775182
BL03SD	62.194280	-159.775893
BL04SD/BL04SW	62.193929	-159.776768
BL05SD/BL05SW	62.193413	-159.778397
BL06SW	62.193867	-159.775164
BL07SW	62.193387	-159.776378
BL08SW	62.192918	-159.778718

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# E Cleanup Options Cost Spreadsheets

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				l arge Big	Big Lake, Holy Cross, Alaska	reids Assi / Cross, <i>P</i>	i argered brownields Assessment Big Lake, Holy Cross, Alaska		
Notes 1. Ass 2. Ass 3. Ass 4. Ass 5. Ass	Notes and Assumptions: 1. Assume vehicle and trailer available for temporary rental at Site. 2. Assume field duration of 2 days, exclusive of travel and mobilization. 3. Assume drum and container locations accessible by boat, and drums and containers can be reached by laborers from surface, without the need for divers. 4. Assume no cargo or passenger flight delays. 5. Assume all equipment and supplies can be transported in a single trip, not exceeding 7,000 pounds outbound, 9,000 pounds return trip.	y rental at el and mol by boat, a oorted in a	ental at Site. and mobilization. / boat, and drums red in a single tri	and conta	ainers can t teding 7,00	le reached 0 pounds c	by laborers f	rom surface, 00 pounds re	without the need for divers. sturn trip.
6. Ass	6. Assume all removal work can be accomplished in two full working days on site with crew of four personnel	i two full w	orking da	ys on site	with crew o	f four perso	onnel.		
	ITEM	QTY	UNIT	LABOR	EQUIP	MTRL	UNIT TOTAL	TOTAL	REFERENCE AND NOTES
Direct	Direct Capital Costs								
Remo	Removal of Drums/Containers and Contents								
	Mobilization & Demobilization of Equipment & Personnel	~	each				\$20,086.26	\$20,086	Vendor Estimate and Engineering Estimate (Round trip travel for 4 workers)
	Per Diem + Lodging	14	day				\$255.00	\$3,570	
	Labor - Removal of containers, Overpacking, Sampling, and Cargo Loading	16	day				\$649.00	\$10,384	Vendor quote (4 workers for 4 days at 10 hours per day and including additional travel time)
	Rental equipment-transported	4	dav				\$450.00	\$1.800	Vendor published rate (boat hoist)
	Rental equipment-local	-	each				\$1,000.00	\$1,000	Engineering Estimate
	Equipment ODCs	1	each				\$800.00	\$800	Engineering Estimate (overpacks, drum liners, sampling supplies)
							Subtotal:	\$37,640	
i									
Dispo	Disposal of Drums/Containers and Contents							4	
	Profile Fee	-	each				\$250.00	\$250	Vendor quote
	Off-site Disposal	2	ton				\$585.00	\$1,170	Vendor quote
	Transportation from Site to Off-Site Disposal	~	load				\$850.00	\$850	Engineering Estimate
	Lab Analysis, TCLP, Soil (RCRA metals, VOC. SVOC. PCBs, pH. flashpoint)	4	each				\$545.00	\$2,180	Engineering Estimate (BOA Rate)
							Subtotal:	\$4,450	
Remo	 Removal Oversight								
	Labor, per diem, travel	-	each				\$5,010.00	\$5,010	Engineering Estimate
					Direct	Canital Cos	Direct Canital Costs Subtotal:	\$47 100	
					Remov	al Contind	Removal Contingency (15%)	\$7 065	EPA FS Guidance
					Direc	t Capital C	Direct Capital Costs Total:	\$54,165	
Indire	ndirect Capital Costs								
	Project Management (6%)							\$3,250	EPA FS Guidance
					Indirec	t Capital C	Indirect Capital Costs Total:	\$3,250	
						Total Ca	Total Canital Costs	\$57 000	

EPA 2000, A Guide to Developing and Documenting Cost Estimates During the Feasibility Study, EPA 540-R-00-002, OSWER Directive 9355.0-75 (EPA FS Guidance).

Key: VOC = Volatile Organic Compound SVOC = Semivolatile Organic Compound PCB = Polychlorinated Biphenyl

Notes and 1. Assume 2. Assume 3. Assume 4. Assume	Notes and Assumptions: 1. Assume vehicle and trailer available for temporary rental at Site.		j.						
5. Assume 5. Assume	<ol> <li>Assume field duration of 2 days, exclusive of travel and mobilization.</li> <li>Assume drum and container locations accessible by boat, and drums and containers can be reached by laborers from surface, without the need for divers.</li> <li>Assume no cargo or passenger flight delays.</li> <li>Assume all equipment and supplies can be transported in a single trip, not exceeding 7,000 pounds outbound, 9,000 pounds return trip.</li> <li>Assume all removal work can be accomplished in two full working days on site with crew of four personnel.</li> </ol>	rental at Site. I and mobilization. by boat, and drums orted in a single tri two full working da	zation. I drums a ngle trip, ting days	and conta not excer on site v	iners can b ∍ding 7,000 <i>i</i> ith crew of	e reached ) pounds or four perso	by laborers fr utbound, 9,00	om surface, 30 pounds re	without the need for divers. turn trip.
	WEL	0TY U	UNIT	ABOR	EOUIP	MTRL	UNIT	TOTAL	REFERENCE AND NOTES
Direct Cal	Direct Capital Costs	-	-						
Removal c	Removal of Drums/Containers and Contents								
Mo & F	Mobilization & Demobilization of Equipment & Personnel	- 9	each				\$20,086.26	\$20,086	Vendor Estimate and Engineering Estimate (Round trip travel for 4 workers)
Pe	Per Diem + Lodging	14 0	day				\$255.00	\$3,570	
L O L	Labor - Removal of containers, Overpacking, Sampling, and Cargo Loading	16 0	day				\$649.00	\$10,384	Vendor quote (4 workers for 4 days at 10 hours per day and including additional travel time)
Re	Rental equipment-transported	4	dav				\$450.00	\$1.800	Vendor published rate (boat hoist)
Re	Rental equipment-local		each				\$1,000.00	\$1,000	Engineering Estimate
Eq	Equipment ODCs	1 e	each				\$800.00	\$800	Engineering Estimate (overpacks, drum liners, sampling supplies)
							Subtotal:	\$37,640	
Disposal c	Disposal of Drums/Containers and Contents								
Prc	Profile Fee		each				\$250.00	\$250	Vendor quote
đ	Off-site Disposal	2	ton				\$50.00	\$100	Vendor quote
Tra Dis	Transportation from Site to Off-Site Disposal	1	load				\$850.00	\$850	Engineering Estimate
Lal	Lab Analysis, TCLP, Soil (RCRA metals, VOC, SVOC, PCBs, pH. flashpoint)	4 e	each				\$545.00	\$2,180	Engineering Estimate (BOA Rate)
	-						Subtotal:	\$3,380	
 Removal Oversight	Dversight								
Lal	Labor, per diem, travel	1 e	each				\$5,010.00	\$5,010	Engineering Estimate
				T	Direct (	Canital Cos	Direct Canital Costs Subtotal:	\$5,010	
					Remov	al Continae	Removal Contingency (15%):	\$6.905	EPA FS Guidance
					Direct	Capital C	Direct Capital Costs Total:	\$52,935	
Indirect C	ndirect Capital Costs								
Prc	Project Management (6%)							\$3,176	EPA FS Guidance
					Indirect	Capital C	Indirect Capital Costs Total:	\$3,176	
						Total Cap	Total Capital Costs:	\$56,000	

EPA 2000, A Guide to Developing and Documenting Cost Estimates During the Feasibility Study, EPA 540-R-00-002, OSWER Directive 9355.0-75 (EPA FS Guidance).

Key: VOC = Volatile Organic Compound SVOC = Semivolatile Organic Compound PCB = Polychlorinated Biphenyl



# Sample Results and Data Validation Memoranda

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Description:     Project Code:     Project Code:     Project Code:     Project Code:     Project Code:     Control Manual Manua Manual Manual Manual Manua Manual Manual Manual Manua M	Project Code: BFP-000A     Code: BFP-000A     Code: BFP-000A       const Kann Ali     Const K     Const K     Const K       dentifier     CLP     Matrix/95mmpler     Colin     Const K       dentifier     SCLP     Matrix/95mmpler     Colin     Const K       dentifier     CLP     Matrix/95mmpler     Colin     Const K       dentifier     CLP     Waters/START     Granb     Restroad     DecoRetO(21)     3(ACI), 4 (PCI), 5 (PCI), 60       dentifier     Sconst K     Granb     DecoRetO(21)     3(ACI), 4 (PCI), 5 (PCI), 60     DecoRetO(21)     Death       dentifier     Maters/START     Granb     DecoRetO(21)     3(ACI), 4 (PCI), 6 (PCI), 60     Dentificr       dentifier     Maters/START     Granb     DecoRetO(21)     3(ACI), 4 (PCI), 6 (PCI), 60     Dentificr       dentifier     Maters/START     Granb     ProcRetO(21)     3(ACI), 4 (PCI), 60     Dentificr       dentifier     Maters/START     Granb     ProcRetO(21)     3(ACI), 4 (PCI), 60     Dentificr       dentifier     Maters/START     Granb     ProcRetO(21)     3(ACI), 4 (PCI), 60     Dentificr       dentifier     Maters/START     Granb     ProcRetO(21)     3(ACI), 4 (PCI), 60     Dentificr     Dentificr       dentifier     Dentifi	Page 1 of 1 EPA R10 Lab (MEL) COC (LAB COPY)	I) COC (FAB (	сору)		CHAIN OF CUSTODY RECORD		51018	No: 10-061815-153421-0009	-153421-0009
Analysis/Turnaround     Tag/Preservative/Bottles     Location       (Days)     (Days)     3(HCI), 7 (HCI), 8 (HCI), 6     BL05SW     Decention       DROFRO(21)     3(HCI), 7 (HCI), 8 (HCI), 6 (HCI), 6     BL05SW     Decention       (Pays)     (HCI), 7 (HCI), 8 (HCI), 8 (HCI), 6     BL05SW     Decention       (Pays)     (HCI), 7 (HCI), 8 (HCI), 8 (HCI), 6     BL05SW     Decention       (Analysis)     (HCI), 7 (HCI), 8 (HCI), 6     BL05SW     Decention       (Analysis)     (HCI), 7 (HCI), 8 (HCI), 6     BL05SW     Decention       (Analysis)     (HCI), 7 (HCI), 8 (HCI), 6     (HCI), 7     BL05SW       (Analysis)     (HCI), 7 (HCI), 8 (HCI), 6     (HCI), 7       (Analysis)     (HCI), 7     (HCI), 7	Analysis/Turnaround     Tag/Preservative/Bottles     Location       DRO/RRO(21)     3(HCI), 7 (HCI), 8 (HCI) (6)     BL055W     00       DRO/RRO(21)     3(HCI), 7 (HCI), 8 (HCI) (6)     BL055W     00       Analysis/Turnaround     7 (HCI), 7 (HCI), 8 (HCI) (6)     BL055W     00       Analysis/Turnaround     3(HCI), 7 (HCI), 8 (HCI) (6)     BL055W     00       Analysis/Turnaround     3(HCI), 7 (HCI), 8 (HCI) (6)     BL055W     00       Analysis/Turnaround     3(HCI), 7 (HCI), 8 (HCI) (6)     BL055W     00       Analysis/Turnaround     3(HCI), 7 (HCI), 8 (HCI) (6)     BL055W     00       Analysis/Turnaround     3(HCI), 7 (HCI), 8 (HCI) (6)     BL055W     00       Analysis/Turnaround     3(HCI), 7 (HCI), 8 (HCI), 7 (HCI), 8 (HCI), 10     Bhipment for Case C       Analysis/Time     Received by (Signature and Organization)     Date/Time       Date/Time     Received by (Signature and Organization)     Date/Time	DateShipped: 6/19 CarrierName: Ravi AirbiliNo:	у2015 n Air	· .		Project Code: Bf Cooler #:	FP-008A		Account Contact N Contact Phon	Number FiLL IN ame: Linda Ader e: 206-406-3411
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Signature and Organization) Date/Time Received by (Signature and Organization) Date/Time Received by (Signature and Organization) Date/Time Of 101 15	Signature and Organization) Date/Time Received by (Signature and Organization) Date/Time Date/Time Out No. TA. A. M. 6/18/15 2. 2. 3. 2. C. M. M. 6/18/15 2. 3. 3. 2. C. M. M. C. S. C. M. C. S. C.	Sample(s) to be us 5244120 Tag 8	sed for Lab QC:	15244120 Tag 3, 15	244120 Tag	4, 15244120 Tag 5, 15244120		Shipment for Cas Samples Transfe	se Complete? N rred From Chain of	Custody #
Relinquished by (Signature and Organization) Date/Time Received by (Signature and Organization) Date/Time	Relinquished by (Signature and Organization)     Date/Time     Received by (Signature and Organization)     Date/Time       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       Yaid Mark     #     #     #     #     #     #     #       <	Analysis Key: DRC	J/RRO=DRO/RF	RO						
The minutes of opposition of the second opposition oppositio	Tariel de Energianie de Carlo TA-AN 6/18/15 200-20 TA-AN 6/18/15 220 Ele Luce Cece de Churs Terse 9/20/18/15		4 hedebieroff	vo hun autoration un	(action)		A bu (Cignature and Organization)	Date/Time	-	n (Inon Receint
r- 15:39 Eer Lives ersea dechisious wach	r 15:39 Eer Ling erser degistour ward	Tems/Reason	Kelinquisned I	by (Signature and OI	ganization)	1.1	Lo TA-AN	6/18/15	Anc. T.	5.9°
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07/27/2015		Page 5257 of 5269	
10-061815-153013-0008 Account Number FILL IN Contact Name: Linda Ader Contact Phone: 206-406-3411	For Lab Use Only	Custody #	Sample Condition Upon Receipt $A_{AC} = T: 5.2 cc$ M tect T = 3.8
No: 10-061815-153013-0008 Account Number FILL IN Contact Name: Linda Ader Contact Phone: 206-406-3411	Collection Date/Time	06/18/2015 12:30	Sample Conditi Arc - 7 Wrtc (T
-	Location	BL05SW 06/18/2015 12:30	Date/Time 6/19/15 15:20 10/20/-
record -003A	Tag/Preservative/Bottles	ωV	terTime Received by (Signature and Organization) Date/Time Sample Condition Upon Receipt 6/19/15 A.c. T: 5.9 C
CHAIN OF CUSTODY RECORD Project Code: BFP-008A Cooler #:	Analysis/Turnaround (Davs)	Sample No.         Materi START         Grab         Pest/PAH(21)         36 (< 6 C), 37 (< 6 C), 34 (< 6 C), 41 (< 7 C), 41 (<	Date/Time Received
	Coll. Method	Grab Grab 5244120 Tag	(ganization)
ору)	Matrix/Sampler	Water/ START	PAH=Pest/PAH Relinquished by (Signature and Organization)
) COC (LAB C) 015 Air	CLP Sample No	d for Lab QC:	AH=Pest/PAH
Page 1 of 1 EPA R10 Lab (MEL) COC (LAB COPY) DateShipped: 6/19/2015 CarrierName: Ravn Air AirbillNo:	Sample Identifier	15244120 Sample(s) to be use	Analysis Key: Pest/PAH=Pest/PAH Items/Reason Relinquished by

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Page 2 of 2 EPA R10 Lab (MEL) COC (LAB COPY)	EL) COC (LAB (	сору)		CHAIN OF CUSTODY RECORD	Y RECORD		No: 10-061815-153518-0010 Account Number FiLL IN	061.815-153518-0010 Account Number FiltL IN
Dat <sup>is</sup> Shipped: 6/19/2015 CarrierName: Ravn Air AirbillNo:	8/2015 n Air		• • •	Project Code: BFP-008A Cooler #:	:P-008A		Contact Na Contact Phone	Contact Name: Linda Ader Contact Phone: 206-406-3411
Sample Identifier		Matrix/Sampler	Coll. Mothod	Analysis/Turnaround	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
15244120	Sample No.	Water/STARF	Grab	GR0(21), VOAs(21)	10 (HCl), 11 (HCl), 12 (HCl), 13 (HCl), 14 (HCl), 15 (HCl), 16 (HCl), 17 (HCl), 15 (HCl), 19 (HCl), 20 (HCl), 21 (HCl), 22 (HCl), 23 (HCl), 24 (HCl), 25 (HCl), 26 (HCl), 27 (HCl), (18)	BLOSSW	06/18/2015 12:30	
15244124		Water/ START	Grab	GRO(21), VOAs(21)	C (HCI), D (HCI), E (HCI), K (HCI), L (HCI), M (HCI) (8)	TB02WT	06/17/2015 14:10	
	*							
Sample(s) to be us	sed for Lab QC	Sample(s) to be used for Lab QC: 15244120 Tag 27				Shipment for Case Complete? Y Samples Transferred From Chai	Shipment for Case Complete? Y Samples Transferred From Chain of Custody #	Custody #
Analysis Key: GR(	0=GRO, VOAs	;=Volatiles (VOAs), P.	AH/M+/PCB/F	Analysis Key: GRO≂GRO, VOAs=Volatiles (VOAs), PAH/M+/PCB/Pest/DRO≈PAH/Metals/PCB/Pest/DRO/RRO (TAT 21 Days)	est/DRO/RRO (TAT 21 Days)			
Itoms/Reason	Relinquished	Relinquished by (Signature and Organization)	rganization)	Date/Time Receive	Received by (Signature and Organization)		Sample Condition Upon Receipt	on Upon Recel
	Level,	All B	el E	left of fis "concerned	Le TA.AN	1/20 1012 1/20 1012	5 Embert	3.4%
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EPA R10 Lab (MEL) COC (LAB COPY)	EL) COC (LAB (	COPY)		CHAIN OF CUSTODY RECORD	DY RECORD		Account	Account Number FILL IN
DateShipped: 6/18/2015 CarrierName: Ravn Air AirbillNo:	3/2015 'n Air			Project Code: BFP-008A Cooler #:	1FP-008A		Contact Nicola	Contact Phone: 206-406-3411
Sample Identifier	-	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Davs)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
15244121		Water/START	Grab	DRO/RRO(21), ICP- AES(21), GC-ECD(21), Pest/PAH(21)	A (HCI), B (HCI), F (HNO3 pH<2), G (< 6 C), H (< 6 C), 1 (< 6 C), J (< 6 C) (7)	BLOGSW	06/17/2015 14:40	
					Cooler/TB Cooler Dsc Wet/Packs	Dig Dig	CBCort uncSr SUV/UL DLab tcking 500 R/C	
Special Instructions: Analvsis Kev: DRO/F	ns: 0/RRO=DRO/R	Special Instructions: Analvsis Kev: DRO/RRO=DRO/RRO, ICP-AES=Metals ICP-AES		+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH		Shipment for Case Complete? N Samples Transferred From Chai	Shipment for Case Complete? N Samples Transferred From Chain of Custody #	f Custody #
Items/Reason	Relinquished	Relinquished by (Signature and Organization)		Date/Time Receiv	Received by (Signature and Organization) Burdul TA - AU	Date/Time S 6/1915 13:12 1	Sample Condition L it Anc. T. 10.9	Sample Condition Upon Receipt

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Toped code EF-006A     Control Manual Structure Societ #       Control Manual Structure       Control Manual Structure       Control Manual Structure       Sample No.       Control Manual Structure       Sample No.       Control Manual Structure       Sample Control Manual Structure       Control Manual Structure       Sample Control Manual Structure	arrierName: Ravn Air rbiliNo: ample Identifier Sample No. Wi 15244118 No. Wi Decial Instructions:		Analysis DRO/RF AES(21), Pest	3FP-008A Tag/Preservative/Bottles A (HCl), B (HCl), F (HNO3 PH<2), G (< 6 C), H (< 6 C), I (< 6 C), J (< 6 C), (7) (< 6 C), J (< 6 C) (7)	BL08SW	Contact Nat Contact Phone: Collection Date/Time 06/17/2015 16:00	me: Linda Ader : 206-406-3411 For Lab Use Only
Analysis/Tumaround     Tag/Preservative/Bottles     Location       (Bays)     DRO/RRO(21), ICP- (C & S C), ICP- A (HC), B (HC), F (HNO3     BL085W     06       DRO/RRO(21), ICP- (C & S C), ICP- (C & S C)     BL085W     06       Pest/PAH(21)     ICP- (C & S C), ICP- (C & S C), ICP- (C & S C)     A (HC), F (HNO3     BL085W     06       Pest/PAH(21)     ICP- (C & S C), ICP- (C & S C)     ICP- (C & S C)     ICP- (C & S C)     ICP- (C & S C)       Pest/PAH(21)     ICP- (C & S C)     ICP- (C & S C)     ICP- (C & S C)     ICP- (C & S C)       Pate/Time     Racebined by (Signature and Organization)     Interfitine     ICP/(C & S C)       I     ICP/(C & S C)     ICP/(C & S C)     ICP/(C & S C)	ample Identifier CLP Mat 5244118 Sample No. We 15244118 Pecial Instructions:			Tag/Preservative/Bottles A (HCl), B (HCl), F (HNO3 PH<2), G (< 6 C), H (< 6 C), I (< 6 C), J (< 6 C), (7)	Location BL08SW	Collection Date/Time 06/17/2015 16:00	For Lab Use Only
DRO/RRO(21), ICP-     A (HCI), B (HCI), F (HNO3     BL08SW     00       AES(21), GC-ECD(21), ICP-     A (HC), B (HC), G (S), J (< 6 C), I (< 6 C)	15244118 We Pecial Instructions:			A (HCl), B (HCl), F (HNO3 pH<2), G (< 6 C), H (< 6 C), I (< 6 C), J (< 6 C), (?) (?)	MS80	06/17/2015 16:00	
High     A       A     Bate/Time       Bate/Time     Received by (Signature and Organization)       Date/Time     Bate/Time       Date/Time     A       A     A       A     B       A     B       A     B	pecial Instructions:						
+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH       Bate/Time       Bate/Time <td>pecial Instructions:</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	pecial Instructions:						
+ Hg CVAAS, GC ECD=PCBs, Pest/PAH=Pest/PAH       - Hg CVAAS, GC ECD=PCBs, Pest/PAH=Pest/PAH       - Hg CVAAS, GC ECD=PCBs, Pest/PAH=Pest/PAH       - Date/Time       - Received by (Signature and Organization)       - Date/Time       - Date/Time       - Date/Time       - Date/Time       - Date/Time       - Date/Time	pecial Instructions:						
+ Hg CVAAS, GC ECD=PCBs, Pest/PAH=Pest/PAH     Shipment for Case C       Samples Transferred     Simples Transferred       A S / S / S / S / S / S / S / S / S / S	pecial Instructions:						
Hg CVAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH Bate/Time Received by (Signature and Organization) Date/Time (19/15 1 Y-10) 2016/Time (19/15 1 Y-10) 2016	pecial Instructions:						
+ Hg CVAAS, GC:ECD=PCBs, Pest/PAH=Pest/PAH     Shipment for Case C       Samples Transferred     Shipment for Case C       Bate/Time     Bate/Time       Date/Time     Bate/Time       Bate/Time     Bate/Time       Bate/Time     Bate/Time	pecial Instructions:						
+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH     Shipment for Case C       - Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH     Shipment for Case C       - Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH     Shipment for Case C       - Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH     Date/Time	pecial Instructions:						
+ Hg CVAAS, GC-ECD=PCBs, Peet/PAH=Pest/PAH     Shipment for Case C       Samples Transferred     Shipment for Case C       Bate/Time     Received by (Signature and Organization)     Date/Time       Ø/(g/) S 1 Y:10     Ø/(f) S 1 Y:10     Ø/(f) S 1 Y:10	pecial Instructions:						
+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH     Shipment for Case C       Samples Transferred     Shipment for Case C       Bate/Time     Received by (Signature and Organization)     Date/Time	pecial Instructions:						
+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH Bate/Time Received by (Signature and Organization) Date/Time (CVAS, GC-ECD=PCBs, Pest/PAH) Date/Time Received by (Signature and Organization) Date/Time (CVAS, GC-ECD=PCBs, Pest/PAH) (CVAAS, GC-ECD=PCBs, Pest/PAH) Date/Time Received by (Signature and Organization) Date/Time (CVAS) (CVAAS, GC-ECD=PCBs, Pest/PAH) Date/Time Received by (Signature and Organization) Date/Time (CVAS) (CVAAS, GC-ECD=PCBs, Pest/PAH) (CVAAS, PC-ECD=PCBs, PAH) (CVAAS, PC-ECD=PCBs, PAH) (CVAAS, PC-ECD=PCBs, PAH) (CVAAS, PC-ECD=PCBs, PAH) (CVAAS, PC-ECD=PCBs, PAH) (CVAAS, P	pecial Instructions:						
+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH + Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH bate/Time Received by (Signature and Organization) Date/Time Bate/Time (17/15 17:15) Date/Time (17/15) Date/Ti	pecial Instructions:						
+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH Bate/Time Received by (Signature and Organization) Date/Time Bate/Time (17/15 1 1/10) 2000 2000 2000 2000 2000 2000 2000 2	pecial Instructions:						
+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH Bate/Time Received by (Signature and Organization) Date/Time Bate/Time (17/1/5 13:45) 6/13/15 1 7:10 202 202 202 202 202 202 202 202 202 2	pecial Instructions:					• • • • • • • • • • • • • • • • • • •	
+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH Shipment for Case C Samples Transferred Date/Time EAS/S C-ECD=PCBs, Pest/PAH=Pest/PAH Date/Time EAS/S C-ECD=PCBs, Pest/PAH=Pest/PAH Bate/Time EAS/S C-ECD=PCBs, Pest/PAH=Pest/PAH Bate/Time	pecial Instructions:						
+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH       Shipment for Case C         + Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH       Date/Time         Date/Time       Received by (Signature and Organization)       Date/Time          bate/Time       Received by (Signature and Organization)       Date/Time	becial Instructions: adveis Kavn DRO(RRO_IC						
+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH Date/Time Received by (Signature and Organization) Date/Time <i>b</i> / <i>b</i>	Namera Kaw DRO/DRO=DRO/RRO IC			0 0	Shipment for Cas Samples Transfel	se Complete? N rred From Chain of C	Custody #
Relinquished by (Signature and Organization) Date/Time Received by (Signature and Organization) Date/Time Zerie Add S. E. E. E. E. S. S. C.		CP-AES=Metals ICP-AE		Pest/PAH=Pest/PAH			
Zwie Ad Exe class rosan and but but while with	-	ignature and Organizatio	Date/Time	red by (Signature and Organization)	Date/Time	6t	n Upon Recei
- 6/13/15 14:10 Zach D 6120/15 1045 3	T P A.	1	chele n'adana	Rin hum	6/19/15		4. <del>)</del>
	- Contraction of the	1 1	6/18/15 14.10 Par	at 2	420/5-10	Μ.	5:4
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Page 1 of 1 EPA R10 Lab (MEL) COC (LAB COPY) DateShinned: 6/18/2015	EL) COC (LAB C	(YAOS		CHAIN OF CUSTODY RECORD	JDY RECORD		No: 10-061815-084334-0001 Account Number FiLL IN	<b>161815-084334-0001</b> Account Number FiLL IN	91000
CarrierName: Ravn Air AirbillNo:	in Air			Project Code; BFP-008A Cooler #:	BFP-008A #:		Contact Ne Contact Phone	Contact Name: Linda Ader Contact Phone: 206-406-3411	20/20
Sample Identifier	r CLP Samula No	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Davs)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only	
15244116		Water/ START	Grab	DRO/RRO(21), ICP- AES(21), GC-ECD(21), Pest/PAH(21)	A (HCI), B (HCI), F (HNO3 pH<2), G (<6 C), H (<6 C), I (< 6 C), J (< 6 C) (7)	BL01SW	06/17/2015 14:40		
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Special Instructions:	us:				0	Samples Transfé	Samples Transferred From Chain of Custody #	Custody #	
Analysis Key: DR	O/RRO=DRO/R	Analysis Key: DRO/RRO=DRO/RRO, ICP-AES=Metals ICP-AES	SICP-AES +	+ Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH	s, Pest/PAH=Pest/PAH				
Home/Dogeon	Delinguiched	Belinchished by (Signature and Organization)	danization)	Date/Time Recei	Received by (Signature and Organization)	Date/Time		Sample Condition Upon Receipt	
S AMPLES		10 - N3	START	03	d TA-AN	6/19/15	is Anc.T.	J.t.S	
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EPA R10 Lab (MEL) COC (LAB COPY)	EL) COC (LAB C	(Ydot		CHAIN OF CUSTODY RECORD	Y RECORD		NO: 10-0515-035149-000	0161615-033749-0000
DateShipped: 6/18/2015	3/2015			Drolant Code: RFD-008A	P-DDRA		Contact Ne	Contact Name: Linda Ader
CarrierName: Ravn Air	n Air			Fruject Couler #:			<ul> <li>Contact Phone</li> </ul>	Contact Phone: 206-406-3411
								1
Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
15244116		Water/START	Grab	GRO(21), VOAs(21)	c (Hcl), D (Hcl), E (Hcl), K (Hcl), L (Hcl), M (Hcl) (6)	BL01SW	06/17/2015 14:40	
15244117		Water/ START	Grab	GRO(21), VOAs(21)	c (Hcl), D (Hcl), E (Hcl), K (Hcl), L (Hcl), M (Hcl) (6)	BL02SW	06/17/2015 15:10	
15244118		Water/ START	Grab	GRO(21), VOAs(21)	c (Hcl), D (Hcl), E (Hcl), K (Hcl), L (Hcl), M (Hcl) (6)	BL08SW	06/17/2015 16:00	
15244119		Water/START	Grab	DRO/RRO(21), GRO(21), ICP-AES(21), GC- ECD(21), Pest/PAH(21), VOAS(21)		BL04SW	06/17/2015 15:15	
15244121	· · · ·	Water/ START	Grab	GRO(21), VOAs(21)	C (HCI), D (HCI), E (HCI), K (HCI), L (HCI), M (HCI) (6)	BLO6SW	06/17/2015 14:40	
15244122		Water/ START	Grab	GRO(21), VOAs(21)	C (HCI), D (HCI), E (HCI), K (HCI), L (HCI), M (HCI) (6)	BL07SW	06/17/2015 15:35	
15244123		Water/ START	Grab	GRO(21), VOAs(21)	C (HCI), D (HCI), E (HCI), K (HCI), L (HCI), M (HCI) (6)	TB01WT	06/17/2015 14:00	
						Shipment for Case Complete? N	se Complete? N	
Special Instructions:	IS:					Samples Transfe	Samples Transferred From Chain of Custody #	Custody #
Analysis Key: GR	O=GRO, VOAs=	-Volatiles (VOAs), DI	RO/RRO=DR	O/RRO, ICP-AES=Metals ICP.	Analysis Key: GRO=GRO, VOAs=Volatiles (VOAs), DRO/RRO=DRO/RRO, ICP-AES=Metals ICP-AES + Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH	3s, Pest/PAH=Pes	t/PAH	
Items/Reason	Relinquished	Relinquished by (Signature and Organization)	ganization)	Date/Time Receive	Received by (Signature and Organization)	Date/Time		Sample Condition Upon Receipt
	L'and a	Ach Edi		istratis icitation	mult -	6/19/15- (C/2)2/10	3:15 Muett:	2/0/0
	-			the second se				

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	210	G/Z	.612	.0.						090	3 JO A	and and	D											
	153518-0010	Account Number FILL IN	Contact Name: Linda Ader	Contact Phone: 200-400-3411	For Lab Use Only								Custody #		Sample Condition Upon Receipt	1 1 0	7.40	3,6						
	No: 10-061815-153518-0010	Account	Contact Na	Contact Phone	Collection Date/Time	06/17/2015 09:40	06/17/2015 10:17	06/17/2015 11:30	06/17/2015 12:10	06/17/2015 16:30		Complete? Y	ed From Chain of		Sample Condition	V	0 (the 1.	the THREE						
					Location	BL01SD	BL02SD	BL03SD		BL05SD	, TB01SD	Shipment for Case Complete? Y	Samples Transferred From Chain of Custody #		Date/Time	10/10/15	12	0151/02/0						
, -	RECORD	•	-008A	•	Tag/Preservative/Bottles	B (MeOH), E (0 C), F (0 C), G (0 C), H (< 6 C), I (< 6 C), J (< 6 C), K (< 6 C), L (< 6 C) (9)	43 (< 6 C), B (MeOH), E (0 C), F (0 C), G (0 C), H (< 6 C) (6)	45 (< 8 C), B (MeOH), E (0 C), F (0 C), G (0 C), H (< 6 C), I (< 6 C) (7)	E (0 C), F (0 C), G (0 C), H (< 6 C), I (< 6 C) (5)	E (0 C), F (0 C), G (0 C), H (< 6 C), I (< 6 C) (5)	A (MeOH) (1)			t/DRO/RRO (TAT 21 Days)	Received by (Signature and Organization)		~ 14·4N	K.	NA CONTRACTOR OF A			·		
	CHAIN OF CUSTODY RECORD		Project Code: BFP-008A	Cooler #:	Analysis/Turnaround (Days)	<pre></pre>	PAH/M+/PCB/Pest/DRO(21), VOAs(21)	PAH/M+/PCB/Pest/DRO(21), 'GRO(21),' GRO(21),'	VOAs(21), PAH/M+/PCB/Pest/DRO(21 )	/ VOAs(21), PAH/M+/PCB/Pest/DRO(21	GRO(21)	E, 15244101 Tag F, 15244101 Tag G, 15244101 Tag H, 1 15244120 Tag 10 15244120 Tag 11, 15244120 Tag 12,	15244101 199 1, 15244120 Tag 13, 15244120 Tag 15, 15244120 Tag 15, 15244120 Tag 17, 15244120 Tag 18, 15244120 Tag 15244120 Tag 13, 15244120 Tag 14, 15244120 Tag 15, 15244120 Tag 16, 15244120 Tag 17, 15244120 Tag 28, 15244120 19, 15244120 Tag 20, 15244120 Tag 21, 15244120 Tag 22, 15244120 Tag 23, 15244120 Tag 24, 15244120 Tag 25, 15244120 Tag 25, 15244120 Tag 28, 15244120 Tag	Analysis Key: GRO=GRO, VOAs=Volatiles (VOAs), PAH/M+/PCB/Pest/DRO=PAH/Metals/PCB/Pest/DRO/RRO (TAT 21 Days)	Date/Time Received		1/2/5 routon Unan	20 K						
				ļ	Coll. Method	Grab	Grab	Grab	Grab	Grab	Grab	244101 Tag E	5, 15244120 g 22, 152441	NH/M+/PCB/P	danization)	dameauou)								
	, (Yqc				Matrix/Sampler	Sediment/ START	Sediment/ START	Sediment/ START	Sediment/ START	Sediment/ START	Sediment/ Test America	Sample(s) to be used for Lab QC: 15244101 Tag B, 15244101 Tag	4, 15244120 Tag 1, 3g 21, 15244120 Ta	/olatiles (VOAs), P/	Belincuished hv (Sknafure and Organization)		Ad me							
	L) COC (LAB CC	2015	Air	A martine	CLP Sample No-	For Yez	crale rof	materal by used :	metels) PCBS/	RACI	X	ed for Lab QC: 1	2444120 Tag 0, 1 15244120 Tag 1, 20, 15244120 Ta Tan 27	=GRO, VOAs=V	Dalinguished h	(n natisinhilliau	when a superfit a			and and a second s	. ~			
Page 1 of 2	EPA R10 Lab (MEL) COC (LAB COPY)	DateShipped: 6/19/2015	CarrierName: Ravn Air	AirbiliNo:	Sample Identifier	15244101	15244102	15244103	15244104	15244105	15244114	Sample(s) to be us	15244100 1491, 15 15244120 Tag 13, 19, 15244120 Tag 13 Tag 75, 15244120	Analysis Key: GRO	theme/Docen	Items/Reason		3					, Ś.,	

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10-061815-153518-0010 Account Number FILL IN Contact Name: Linda Ader Contact Phone: 206-406-3411	For Lab Use Only				Custody # n Upon Receipt 3. 4 °C 3. 6	
No: 10-061815-153518-0010 Account Number FILL IN Contact Name: Linda Ader Contact Phone: 206-406-3411	Collection Date/Time	.06/18/2015 12:30	06/17/2015 14:10		Shipment for Case Complete? Y Samples Transferred From Chain of Custody # Date/Time Sample Condition Upon Receipt 6/18/1573 Auc. T. 3.4°C 1573 Auc. T. 3.4°C	
	Location	MSSOL	TB02WT		Shipment for Case Complete? Y Samples Transferred From Chai Date/Time Sample Coi 6/1.P[15] 13517.0 Auc. 13517.0 Auc.	
RECORD -008A	Tag/Preservative/Bottles	10 (HCl), 11 (HCl), 12 (HCl), 13 (HCl), 14 (HCl), 15 (HCl), 16 (HCl), 17 (HCl), 18 (HCl), 19 (HCl), 20 (HCl), 21 (HCl), 22 (HCl), 23 (HCl), 24 (HCl), 25 (HCl), 26 (HCl), 27 (HCl), 25 (HCl), 26 (HCl), 27 (HCl), 26 (HCl), 26 (HCl), 27 (HCl), 26 (HCl), 26 (HCl), 27 (HCl), 27 (HCl), 26 (HCl), 27 (HCl), 26 (HCl), 26 (HCl), 27 (HCl), 27 (HCl), 26 (HCl), 27 (HCl), 26 (HCl), 26 (HCl), 27 (HCl), 26 (HCl), 26 (HCl), 27 (HCl), 27 (HCl), 26 (HCl), 27 (HCl), 26 (HCl), 26 (HCl), 27 (HCl), 27 (HCl), 26 (HCl), 27 (HCl), 26 (HCl), 26 (HCl), 27 (HCl), 27 (HCl), 27 (HCl), 27 (HCl), 27 (HCl), 27 (HC	c (Hcl), D (Hcl), E (Hcl), K (Hcl), L (Hcl), M (Hcl) (6)		PCB/Pest/DRO/RRO (TAT 21 Days) Received by (Signature and Organization) ULUUU TA AN	
CHAIN OF CUSTODY RECORD Project Code: BFP-008A Cooler #:	Analysis/Turnaround (Days)	GRO(21), VOAs(21)	GRO(21), VOAs(21)		est/DRO=PAH/Metals/PCB/Pest/DRO/RRO (TAT 21 Days) Date/Time Received by (Signature and Organiza	
	Coll. Method	Grab	Grab		danization)	
(Y40)	Matrix/Sampler	Water/ START	Water/ START		Sample(s) to be used for Lab QC: 1524120 Tag 27 Analysis Key: GRO=GRO, VOAs=Volatiles (VOAs), PAH/M+/PCB/P Items/Reason Relinquished by (Signature and Organization)	
.) COC (LAB C 2015 Air	CLP Sample No.				ed for Lab QC: =GRO, VOAs= Relinquished H	
Page 2 of 2 EPA R10 Lab (MEL) COC (LAB COPY) DateShipped: 6/19/2015 CarrierName: Ravn Air AirhillNo:	Sample Identifier	15244120	15244124		Sample(s) to be used for Lab QC: 15244120 Tag 27 Analysis Key: GRO=GRO, VOAs=Volatiles (VOAs), Items/Reason Relinquished by (Signature and	

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Page 1 of 1 EPA R10 Lab (MI	age 1 of 1 EPA R10 Lab (MEL) COC (LAB COPY)	серу)		CHAIN OF CUSTODY RECORD	DY RECORD		No: 10-061815-093749-0006 Account Number FILL IN	<b>161815-093749-0006</b> Account Number FILL IN
DateShipped: 6/18/2015	8/2015			Project Code: BFP-008A	3FP-008A		Contact Na	Contact Name; Linda Ader
Carriername: Kavn Air Airbilino:				Cooler #	#:		Contact Phone	Contact Phone: 206-406-3411
Sample Identifier	er CLP Sampla No	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only
15244116		Water/ START	Grab	GRO(21), VOAs(21)	c (Hcl), D (Hcl), E (Hcl), K (Hcl), L (Hcl), M (Hcl) (6)	BL01SW	06/17/2015 14:40	
15244117		Water/ START	Grab	GRO(21), VOAs(21)	C (HCI), D (HCI), E (HCI), K (HCI), L (HCI), M (HCI) (6)	BL02SW	06/17/2015 15:10	
35244118		Water/ START	Grab	GRO(21), VOAs(21)	c (HcI), D (HcI), E (HcI), K (HcI), L (HcI), M (HcI) (6)	BL08SW	06/17/2015 16:00	
15244119		Water/ START	Grab	DRO/RRO(21), GRO(21), ICP-AES(21), GC- ECD(21), Pest/PAH(21), VOAs(21)		BL04SW	06/17/2015 15:15	
15244121		Water/ START	Grab	GRO(21), VOAs(21)	C (HCI), D (HCI), E (HCI), K (HCI), L (HCI), M (HCI) (6)	BL06SW	06/17/2015 14:40	
15244122		Water/ START	Grab	GRO(21), VOAs(21)	C (HCI), D (HCI), E (HCI), K (HCI), L (HCI), M (HCI) (6)	BL07SW	06/17/2015 15:35	
15244123		Water/ START	Grab	GRO(21), VOAs(21)	C (HCI), D (HCI), E (HCI), K (HCI), L (HCI), M (HCI) (6)	TB01WT	06/17/2015 14:00	
	-					Shipment for Case Complete? N	se Complete? N	
Special Instructions: Analysis Key: GRO=	ons: {O=GRO, VOAs=	Special Instructions: Analvsis Kev: GRO=GRO, VOAs=Volatiles (VOAs), DRO/RRO=DR	₹0/RR0=DR	0/RR0, ICP-AES=Metals IC	Samples Transferred F O/RRO, ICP-AES=Metals ICP-AES + Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH	Samples Transfe 3s, Pest/PAH≃Pes	Samples Transferred From Chain of Custody # ls, Pest/PAH=Pest/PAH	f Custody #
Items/Reason	Relinquished t	Relinquished by (Signature and Organization)	ganization)	Date/Time	Received by (Signature and Organization)	Date/Time		Sample Condition Upon Receipt
	Thereadly when	Jah Ed E		telegles 1023 dans	el de c	CC/20110	15 An +. T .:	610
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-061815-152240-0007 Account Number FILL IN Contact Name: Linda Ader ttact Phone: 206-406-3411	For Lab Use Only		custody #
No: 10-061815-152240-0007 Account Number FILL IN Contact Name: Linda Ader Contact Phone: 206-406-3411	Collection Date/Time	06/18/2015 12:30	Complete? N ed From Chain of Custody # Sample Condition Upon Receipt Auc T. S. (°C Inted S. C
2	Location	BLOSSW	Shipment for Case Complete? N Samples Transferred From Chain of Custody Date/Time Sample Condition Upon R (11 R15 20 Put CT 5 5 Mt CU 5 Dut CU 5, 5 Mt CU
r <b>record</b> 008A	Tag/Preservative/Bottles	28 (HNO3 pH<2), 29 (HNO3 pH<2), 30 (< 6 C), 31 (< 6 C), 32 (< 6 C), 33 (< 6 C), 34 (< 6 C), 35 (< 6 C) (8)	
CHAIN OF CUSTODY RECORD Project Code: BFP-008A Cooler #:	Analysis/Turnaround (Days)	ICP-AES(21), GC- ECD(21)	Sample(s) to be used for Lab QC: 15244120 Tag 28, 15244120 Tag 30, 15244120 Tag 31, 15244120 Tag 31, 15244120 Tag 33, 15244120 Tag 34, 15244120 Tag 35, 15244120 Tag 33, 15244120 Tag 34, 15244120 Tag 35, 15244120 Tag 35, 15244120 Tag 35, 15244120 Tag 36, 15244120 Tag 37, 15244120 Tag 32, 15244120 Tag 31, 15244120 Tag 35, 15244120 Tag 35, 15244120 Tag 32, 15244120 Tag 34, 15244120 Tag 34, 15244120 Tag 34, 1524412, 15441412, 15441414, 15441441414412, 1544144144141441414414414414414414414
	Coll. Method	Grab	5244120 Tag GG-ECD=P
OPY)	Matrix/Sampler	Water/START	of for Lab QC: 15244120 Tag 28, 15244120 Ti 15244120 Tag 34, 15244120 Tag 35 ES=Metals ICP-AES + Hg CVAAS, GC-ECD= Relinquished by (Signature and Organization)
.) COC (LAB C 2015 Air	CLP Sample No.		ed for Lab QC: 15244120 Tag 3 Kellnquished b
EPA R10 Lab (MEL) COC (LAB COPY) DateShipped: 6/19/2015 CarrierName: Ravn Air AirbillNo:	Sample Identifier	15244120	Sample(s) to be used for Lab QC: 15244120 Tag 28, 15244120 Tag 35, 15244120 Tag 34, 15244120 Tag 35 http://www.science.com/accience/accien

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Page 1 of 1				CHAIN OF CUSTODY RECORD	V RECORD		No: 10-061815-092226-0002		5
EPA R10 Lab (M	EPA R10 Lab (MEL) GOC (LAB GOPY)	(0HY)					Account		102
DateShipped: 6/18/2015 CarrierName: Ravn Air	cruz/s vn Air			Project Code: BFP-008A	:P-008A		Contact Ne		12212
AirbillNo:			×.	Coaler #:			Contact Phone	Contact Phone: 200-400-3411	10
Sample Identifier	er CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	For Lab Use Only	
15244117	•	Water/ START	Grab	DRO/RRO(21), ICP- AES(21), GC-ECD(21), Pest/PAH(21)	A (HCI), B (HCI), F (HN03 pH<2), G (< 6 C), H (< 6 C), I (< 6 C), J (< 6 C) (7)	BL02SW	06/17/2015 15:10		
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and the second se									; ło
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2									22
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						Shipment for Case Complete? N	se Complete? N		
Special Instructions:	:suc					Samples Transfe	Samples Transferred From Chain of Custody #	Custody #	
Analysis Key: DF	30/RRO=DRO/RF	Analysis Key: DRO/RRO=DRO/RRO, ICP-AES=Metals ICP-AES	s ICP-AES +	Hg CVAAS, GC-ECD=PCBs, Pest/PAH=Pest/PAH	Pest/PAH=Pest/PAH				
Items/Reason	Relinquished t	Relinquished by (Signature and Organization)	ganization)	Date/Time Receive	Received by (Signature and Organization)	Date/Time	Sample Condition	Sample Condition Upon Receipt	
				1 hal with a	2 - 2 - 2	6/17/15	Anc-1: 6.0°	109:	
	and all markers and a water	Lot a low atomation			0, 11	10/20	Dutad	2.0	
- 2	Z	to		0/12/12 14:202/C	2X V	1011			
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ecology and environment, inc. Global Environmental Specialists

720 Third Avenue, Suite 1700 Seattle, Washington 98104 Tel: (206) 624-9537, Fax: (206) 621-9832

# MEMORANDUM

DATE:	July 30, 2015	3	Sec. 1	$d_{B}(x) = q - q^2 q_{B} k$
TQ:	Linda Ader, START-IV Project M	Ianager, E & E, Seattle, WA	ų .	$\{e^{i,i},e_{i}\} \neq j,$
FROM:	Mark Woodke, START-IV Chem	ist, E & E, Seattle, Washington-	Mu -	i Aliteration d
SUB <i>k</i>	Organic Data Quality Assuranc Holy Cross-AK Big Lake Site, H		1	in siden non Social Trade
REF:	TDD: 14-08-6001	PAN: 1004530.0005.013.01	1.1263	, <b>1</b> , 48

The data quality assurance review of 5 soil and 7 water samples collected from the Holy Cross AK Big Lake site located in Holy Cross, Alaska, has been completed. Analysis for Diesel Range Organics (DRO) and Residual Range Organics (RRO), both silica-gel treated and untreated (ADEC Methods AK-102 and AK-103) was performed by Test America, Inc., Tacoma, WA. All sample analyses were evaluated following EPA's Stage 2B and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M)

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The samples were numbered:

15244116	15244117	15244118	15244119	15244120
15244121	15244122	15244101	15244102	15244103
15244104	15244105			

# Data Qualifications:

# 1. Sample Holding Times: Acceptable.

The samples were maintained at  $< 6^{\circ}$ C. The samples were collected on June 17 and 18, 2015, extracted by July 14, 2015, and analyzed by July 3, 2015, therefore meeting QC criteria of less than 7 days between collection and extraction for water samples, less than 14 days between collection and extraction for soil samples, and less than 40 days between extraction and analysis.

# 2. Initial Calibration: Acceptable.

Calculations were verified as correct. All relative percent differences (RPDs) were within the laboratory control limits.

# 3. Continuing Calibration: Satisfactory.

Calculations were verified as correct. All percent differences (%Ds) were within the laboratory

control limits except one low surrogate calibration result; no actions were taken based on this outlier.

# 4. Error Determination: Not Performed.

Samples necessary for bias and precision determination were not provided to the laboratory. All samples were flagged RND (Recovery Not Determined) and PND (Precision Not Determined), although the flags are not found on the Form I's.

# 5. Blanks: Satisfactory.

A method blank was analyzed for each extraction batch for each matrix and analysis system. Diesel- and motor oil-range TPHs were not detected in any blank except DRO (6.22 mg/kg) in the soil method blank (associated with samples 15244101 through 15244105); positive sample results less than five times the blank result were qualified as not detected (U).

# 6. System Monitoring Compounds (SMC): Satisfactory.

All recoveries of the SMCs were greater than 10% and within QC criteria except one slightly low recovery in one method blank; no actions were taken based on one SMC outlier in one method blank.

# 7. Performance Evaluation Samples: Not Provided.

Performance evaluation samples were not provided to the laboratory.

### 8. Matrix and Blank Spikes: Satisfactory.

Matrix and blank spike results were within QC limits except low water sample DRO recoveries in blank spikes and a low soil DRO matrix spike duplicate recovery; associated results were qualified as estimated quantities (J or UJ) with a likely low bias.

# 9. Duplicates: Satisfactory.

Duplicate results were acceptable except the soil matrix spike RRO result; associated positive sample results in sample 15244120 were qualified as estimated (J) and have an unknown bias.

#### 10. Quantitation and Quantitation Limits: Acceptable.

Sample concentrations were correctly calculated.

#### 11. Laboratory Contact: Not Required.

No laboratory contact was required.

# 12. Overall Assessment of Data for Use

From the laboratory narrative - the Diesel Range Organics (DRO) concentration reported for the following samples is primarily due to the presence of discrete peaks: 15244102, 15244103, 15244104, and 15244105. The following sample contained a hydrocarbon pattern in the diesel range; however, the elution pattern was later than the typical diesel fuel pattern used by the laboratory for quantitative purposes: 15244105. The following samples contained a hydrocarbon pattern in the diesel range; however, the

elution pattern was later than the typical diesel fuel pattern used by the laboratory for quantitative purposes: 15244118, 15244119, and 15244121. Associated positive sample results were qualified as estimated quantities (J).

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Directive "Quality Assurance/Quality Control Guidance for Removal Activities, Data Validation Procedures" (EPA/540/G-90/004) and the analytical method. Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

# Data Qualifiers and Definitions

- U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- JQ The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).
- N The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Client: Ecology and Environment, Inc.

Job Number: 580-51018-1

	AK102 & 103 Alaska - Diesel Range O	rganics & Residual Range Organics (GC)
Lab Sample ID: Client Matrix:	580-51018-1 Water	Date Sampled: 06/17/2015 1440 Date Received: 06/20/2015 1045
Client Sample ID:	15244116	

		•	•			
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK102 & 103 3510C 1.0 06/30/2015 1803 06/29/2015 1000	Analysis Batch: Prep Batch:	580-19355 580-19344	-	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume:	TAC017 ZZ51044.D 949.7 mL 1 mL 1 uL
Analyte		Result (n	ng/L)	Qualifi	ier MDL	RL
DRO (nC10- <nc25< td=""><td>2) 2)</td><td>0.075</td><td>n an an an Andrew Station (a Carl and C</td><td>JANG</td><td>0.023</td><td>0.11</td></nc25<>	2) 2)	0.075	n an an an Andrew Station (a Carl and C	JANG	0.023	0.11
RRO (nC25-nC36)		0.054		JG	0.033	0.11
Surrogate		%Rec		Qualifi	ier Acceptar	nce Limits
o-Terphenyl	a natura ya manamani mananya mana na mana na manana na manana na manana na manana na mananya na mananya na mana Na matana ya manana mananya mana na mana na mana na manana na manana na mana na manana na mananya na manana na m	62	in genomi Samon Barlin I. Daarmin fan genomen fan ferdier kaan	n dan isa kina afin ana ina	50 - 150	ana palatan nemen nemen ne nemen kanan ne kanan nemen kanan kanan panan panan ang ang panan ang panan kanan ka
n-Triacontane-d62		70			50 - 150	

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Client: Ecology and Environment, Inc.

Job Number: 580-51018-1

Client Sample ID	15244117							
Lab Sample ID: Client Matrix:	580-51018-2 Water	2 Date Sampled: 06/17/ Date Received: 06/20/						
AK102 & 103 Alaska - Diesel Range Organics & Residual Range Organics (GC)								
	AK102 & 103 Alas	ska - Diesel Range O	rganics & Reside	ual Range Organics (O	SC)			

Dilution: Analysis Date: Prep Date:	1.0 06/30/2015 1821 06/29/2015 1000			Initial Weight/Volume: Final Weight/Volume: Injection Volume:		
Analyte DRO (nC10- <nc2 RRO (nC25-nC3€</nc2 	1	Result (mg/L) 0.088 0.11	) Qualifi J/w/Q	A REPORT OF A R	RL 0.11 0.11	er gin ange, ny ogen
Surrogate o-Terphenyl n-Triacontane-d6	2	%Rec 69 77	Qualifi	er Accepta 50 - 150 50 - 150		(pr14), pr. (pr

MW7-301

Client: Ecology and Environment, Inc.

Client Sample ID:	15244118	
Lab Sample ID: Client Matrix:	580-51018-3 Water	Date Sampled: 06/17/2015 1600 Date Received: 06/20/2015 1045
	AK102 & 103 Alaska - Diesel Range	e Organics & Residual Range Organics (GC)

Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK102 & 103 3510C 1.0 06/30/2015 1839 06/29/2015 1000	Analysis Batch: Prep Batch:	580-193558 580-193443	3 L Ir F	nstrument ID: .ab File ID: nitial Weight/Volume: Final Weight/Volume: njection Volume:	TAC017 ZZ51048.D 1045.1 mL 1 mL 1 uL
Analyte		Result (n	ng/L)	Qualifier	MDL	RL
DRO (nC10- <nc2< td=""><td>5)</td><td>0.063</td><td>Ardinean dariet finan eine statistican di</td><td>JtANQ</td><td>0.021</td><td>0.096</td></nc2<>	5)	0.063	Ardinean dariet finan eine statistican di	JtANQ	0.021	0.096
RRO (nC25-nC36	)	0.090		JQ	0.030	0.096
Surrogate		%Rec		Qualifier	Acceptar	nce Limits
o-Terphenyl	und bezinten ole oleh nizionen et elektronen et elektronen generalet generalet et en elektronen bergeben.	58	n hErz (Erst, mith Arnyn groef i Andre i	natives and the latent of the	50 - 150	and the second se
n-Triacontane-d62	2	65			50 - 150	

MW73045

Client: Ecology and Environment, Inc.

Client Sample ID	: 15244119						
Lab Sample ID: Client Matrix:	580-51018-4 Water						npled: 06/17/2015 1515 ceived: 06/20/2015 1045
		ka - Diesel Range O	rganics & R	esidua	Range (		
Analysis Method:	AK102 & 103	Analysis Batch:	580-19355	8	Instrum	ent ID:	TAC017
Prep Method:	3510C	Prep Batch:	580-19344	3	Lab File	ID:	ZZ51050.D
Dilution:	1.0				Initial W	eight/Volume:	918.3 mL
Analysis Date:	06/30/2015 1857				Final W	eight/Volume:	1 mL
Prep Date:	06/29/2015 1000				Injection	Volume:	1 uL
Analyte		Result (n	ng/L)	Qualif	ier	MDL	RL
DRO (nC10- <nc2< td=""><td>5)</td><td>0.060</td><td>a non-solara a construction de la segundada de la</td><td>JEAN</td><td>Q</td><td>0.024</td><td>0.11</td></nc2<>	5)	0.060	a non-solara a construction de la segundada de la	JEAN	Q	0.024	0.11
RRO (nC25-nC36	)	0.082		J (	2	0.034	0.11

Surrogate	%Rec	Qualifier	Acceptance Limits
o-Terphenyl	57	nander alle de malieren en en en alter el sur la malier de la manier de la manier en la marier en el ser de ma	50 - 150
n-Triacontane-d62	65		50 - 150

MW 7-3015

Client: Ecology and Environment, Inc.

Client Sample ID:	: 15244120				
Lab Sample ID:	580-51018-5			Da	te Sampled: 06/18/2015 1230
Client Matrix:	Water			Da	te Received: 06/20/2015 1045
	AK102 & 103 AI	aska - Diesel Range O	rganics & Reside	ual Range Organics	; (GC)
Analysis Method:	AK102 & 103	Analysis Batch	580-193949	Instrument ID:	TAC017

Analysis Method:	AK102 & 103	Analysis Batch:	580-193949	) Instrum	ent ID:	TAC017
Prep Method:	3510C	Prep Batch:	580-193872	2 Lab File	D:	ZZ51293.D
Dilution:	1.0			Initial V	/eight/Volume:	985.9 mL
Analysis Date:	07/03/2015 1002			Final W	eight/Volume:	1 mL
Prep Date:	07/02/2015 1110			Injectio	n Volume:	1 uL
Analyte		Result (n	ng/L)	Qualifier	MDL	RL
DRO (nC10- <nc2< td=""><td>5)</td><td>0.059</td><td>description in a construction of the first of the second se</td><td>JFT WQ</td><td>0.022</td><td>0.10</td></nc2<>	5)	0.059	description in a construction of the first of the second se	JFT WQ	0.022	0.10
RRO (nC25-nC36	)	0.062		J.FZAN Q	0.031	0.10
Surrogate		%Rec		Qualifier	Acceptar	nce Limits
o-Terphenyl		72	an a	and for the second s	50 - 150	and the constraint of the second order of the advance of the second field of the second for the second of the s
n-Triacontane-d62	2	65			50 - 150	

Mw 73015

Client: Ecology and Environment, Inc.

Client Sample ID:	15244121				
Lab Sample ID: Client Matrix:	580-51018-6 Water				ate Sampled: 06/17/2015 1440 ate Received: 06/20/2015 1045
Manada in an	AK102 & 103 A	laska - Diesel Range O	rganics & Resid	ual Range Organic	cs (GC)
Analysis Method:	AK102 & 103	Analysis Batch:	580-193558	Instrument ID:	TAC017

Analysis Method:	AK102 & 103	Analysis Batch:	580-193558	8 Instru	iment ID:	TAC017	
Prep Method:	3510C	Prep Batch:	580-193443	3 Lab F	ile ID:	ZZ51054.D	
Dilution:	1.0			Initial	Weight/Volume:	1050.3 mL	
Analysis Date:	06/30/2015 1933			Final	Weight/Volume:	1 mL	
Prep Date:	06/29/2015 1000			Inject	ion Volume:	1 uL	
Analyte		Result (n	ng/L)	Qualifier	MDL	RL	
DRO (nC10- <nc2< td=""><td>15)</td><td>0.094</td><td>an na h-inin - an ar trago ann frian an Anna an Anna</td><td>JANQ</td><td>0.021</td><td>0.095</td><td>00-040-040-06-</td></nc2<>	15)	0.094	an na h-inin - an ar trago ann frian an Anna an Anna	JANQ	0.021	0.095	00-040-040-06-
RRO (nC25-nC36	)	0.11			0.030	0.095	
Surrogate		%Rec		Qualifier	Acceptar	ce Limits	
o-Terphenyl	na dananikan manimukanan kan kanadatan inanakan manakan kan	64	n a state en al ser al ser al ser al ser de la materia de la ser al ser de la materia de la ser al ser de la m La ser al ser	Sound State Streams Could Barrier and Long	50 - 150	nen hand in Station for the science down methods and a science	here and the second states of
n-Triacontane-d62	2	76			50 - 150		

MW 7-30-15

Client: Ecology and Environment, Inc.

Client Sample ID:	15244122				
Lab Sample ID: Client Matrix:	580-51018-7 Water				Sampled: 06/17/2015 1535 Received: 06/20/2015 1045
		aska - Diesel Range O	rganics & Resid		
Analysis Method:	AK102 & 103	Analysis Batch:	580-193558	Instrument ID:	TAC017

Analysis Monou.	ART02 0 100	Analysis baton.	000-100000	1150	amont ib.	17,0017	
Prep Method:	3510C	Prep Batch:	580-193443	8 Lab	File ID:	ZZ51058.D	
Dilution:	1.0			Initia	al Weight/Volume:	1049.3 mL	
Analysis Date:	06/30/2015 2009			Fina	al Weight/Volume:	1 mL	
Prep Date:	06/29/2015 1004			Inje	ction Volume:	1 uL	
Analyte		Result (n	ng/L)	Qualifier	MDL	RL	
DRO (nC10- <nc2< td=""><td>55)</td><td>0.070</td><td>n an thai an an</td><td>Jtm. Q</td><td>0.021</td><td>0.095</td><td>the matrix gives the same in-</td></nc2<>	55)	0.070	n an thai an	Jtm. Q	0.021	0.095	the matrix gives the same in-
RRO (nC25-nC36	)	0.11		olan of	0.030	0.095	
Surrogate		%Rec		Qualifier	Acceptan	ce Limits	
o-Terphenyl	nation and an of the second construction of the test of the second second second second second second second s	73	n Christian (n. 1929) familier (n. 1923) a feinige an an Anna Sha	AND ANY CONTRACTOR OF A DAMAGE	50 - 150	nnalleist nienist treasports with each of a physical sector for the de	Construction of the Constr
n-Triacontane-d62		81			50 - 150		

MW 7-30-15

# Client: Ecology and Environment, Inc.

Client Sample ID:	15244101							
Lab Sample ID: Client Matrix:	580-51018-10 Solid	% Moisture	e: 26.7				npled: 06/17/20 eived: 06/20/20	
	AK102 & 103 Alaska	Diesel Range O	rganics & Re	esidual	Range Orga	nics (GC)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK102 & 103 3546 1.0 06/30/2015 1327 06/29/2015 1130	Analysis Batch: Prep Batch:	580-193562 580-19346		Instrument IE Lab File ID: Initial Weight Final Weight Injection Volu	/Volume: /Volume:	TAC017 ZZ51015.D 10.260 g 10 mL 1 uL	
Analyte DRO (nC10- <nc2 RRO (nC25-nC36</nc2 		Y Result (n - <del>26</del> 63	ng/Kg)	Qualifi JØG J	ier MD 8.1 15	L Line di constante di constante di sono	RL 27 () 66	territer developities for Pa
Surrogate o-Terphenyl n-Triacontane-d62	n 14 mai 1 m - Mannananan Kalantarati kata kata kata kata kata kata kata k	%Rec 78 86	radian dika il na Dri an' art a na 1974 dei K	Qualifi		Acceptan 50 - 150 50 - 150	ce Limits	ana ngalangana kata ka

MW 7-30-15

# Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID:	15244102						
Lab Sample ID: Client Matrix:	580-51018-11 Solid	% Moisture	e: 22.7				mpled: 06/17/2015 1017 eceived: 06/20/2015 1045
	AK102 & 103 Alaska -	Diesel Range O	rganics & R	esidual	Range	Organics (GC	)
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK102 & 103 3546 1.0 06/30/2015 1002 06/29/2015 1130	Analysis Batch: Prep Batch:	580-19356 580-19346		Lab Fil Initial V Final V	nent ID: e ID: Veight/Volume: /eight/Volume: n Volume:	0
Analyte DRO (nC10- <nc2 RRO (nC25-nC36)</nc2 	,	Y Result (m 37 170	and a start of the	Qualifi ZBMV ZMV		MDL 7.2 13	RL 24 59
Surrogate o-Terphenyl n-Triacontane-d62	n a dut a canada na mataniman na na na hunda na manan ana na manana sa manana sa manana na manana sa mana Na ang ta ta canada na manana na na na hunda na manana na manana sa manana na manana na manana na manana sa mana	%Rec 59 68	ingenti delem d'ante i a calendi d'heren.	Qualifi	er	Accepta 50 - 150 50 - 150	

MW 730-15

# Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID:	15244103					
Lab Sample ID: Client Matrix:	580-51018-12 Solid	% Moisture	ə: 51.5			mpled: 06/17/2015 1130 ceived: 06/20/2015 1045
	AK102 & 103 Alaska	Diesel Range O	rganics & Re	sidual	Range Organics (GC)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK102 & 103 3546 1.0 06/30/2015 1020 06/29/2015 1130	Analysis Batch: Prep Batch:	580-193562 580-193461		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume:	TAC017 ZZ50995.D 10.088 g 10 mL 1 uL
Analyte	DryWt Corrected:	Y Result (n	ng/Kg)	Qualifie	er MDL	RL
DRO (nC10- <nc2 RRO (nC25-nC36)</nc2 		36 81		JBQ	12 22	41 100
Surrogate		%Rec		Qualifie	er Accepta	nce Limits
o-Terphenyl n-Triacontane-d62	n naderne nie in orzenen um monikalisienen seinende solmsprachenen einen einen einen.	76 82	anan falifat dan di aran di aran di anan di anan da di anan di a	a 971 faalle van	50 - 150 50 - 150	nende stangende Antigener of en de Staffen (d'Annie Staffen (d'Annie Staffen (d'Annie Staffen (de Annie Staffen

MW 7=30-15

Client: Ecology and Environment, Inc.

Client Sample ID:	15244104				
Lab Sample ID: Client Matrix:	580-51018-13 Solid	% Moisture	e: 77.8		mpled: 06/17/2015 1210 eceived: 06/20/2015 1045
	AK102 & 103 Alaska	- Diesel Range O	rganics & Residual	Range Organics (GC	)
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK102 & 103 3546 1.0 06/30/2015 1114 06/29/2015 1130	Analysis Batch: Prep Batch:	580-193562 580-193461	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume:	0
Analyte DRO (nC10- <nc2 RRO (nC25-nC36)</nc2 	/	Y Result (n 230 990	ng/Kg) Qualifi 	J 25	RL 83 210
Surrogate o-Terphenyl n-Triacontane-d62		%Rec 70 83		ier Accepta 50 - 150 50 - 150	

MW 73015

#### Client: Ecology and Environment, Inc.

Surrogate

o-Terphenyl

n-Triacontane-d62

# Job Number: 580-51018-1

Acceptance Limits

50 - 150

50 - 150

Client Sample ID:	15244105						
Lab Sample ID:	580-51018-14				Date San	npled: 06/17/2015 1630	
Client Matrix:	Solid	% Moistur	e: 63.9		Date Received: 06/20/2015 1045		
	AK102 & 103 Alaska	a - Diesel Range O	rganics & Resi	dual Range	Organics (GC)		
Analysis Method:	AK102 & 103	Analysis Batch:	580-193562	Instru	ment ID:	TAC017	
Prep Method:	3546	Prep Batch:	580-193461	Lab F	ile ID:	ZZ51003.D	
Dilution:	1.0			Initial	Weight/Volume:	10.095 g	
Analysis Date:	06/30/2015 1132			Final	Weight/Volume:	10 mL	
Prep Date:	06/29/2015 1130			Injecti	on Volume:	1 uL	
Analyte	DryWt Corrected	I: Y Result (n	ng/Kg) Qi	ualifier	MDL	RL	
DRO (nC10- <nc2< td=""><td>5) 5)</td><td>300</td><td><b></b></td><td>BTAN J</td><td>17</td><td>55</td></nc2<>	5) 5)	300	<b></b>	BTAN J	17	55	
RRO (nC25-nC36)	)	2000	1)		30	140	

Qualifier

%Rec

54

77

MW 7-30-15

**TestAmerica Seattle** 

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ecology and environment, inc.

Global Environmental Specialists

720 Third Avenue, Suite 1700 Seattle, Washington 98104 Tel: (206) 624-9537, Fax: (206) 621-9832

## MEMORANDUM

DATE:	July 30, 2015		
TO:	Linda Ader, START-IV Project	Manager, E & E, Seattle, WA	
FROM:	Mark Woodke, START-IV Che	emist, E & E, Seattle, Washington MW	
SUBJ:	Organic Data Quality Assura Holy Cross-AK Big Lake Site		
REF:	TDD: 14-08-0001	PAN: 1004530.0005.013.01	

The data quality assurance review of 6 soil and 9 water samples collected from the Holy Cross-AK Big Lake site located in Holy Cross, Alaska, has been completed. Analysis for Gasoline Range Organics (ADEC Method AK-101) analyses was performed by Test America, Inc., Tacoma, WA. All sample analyses were evaluated following EPA's Stage 2B and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

15244116	15244117	15244118	15244119	15244120
15244121	15244122	15244123	15244124	15244101
15244102	15244103	15244104	15244105	15244114

#### Data Qualifications:

#### 1. Sample Holding Times: Satisfactory.

The samples were maintained and received within the QC limits of  $< 6^{\circ}$ C. The samples were collected on June 17 and 18, 2015, and were analyzed by July 8, 2015, therefore generally meeting QC criteria of less than 14 days between collection and analysis for soil and preserved water samples; samples that exceeded holding time limits were qualified as estimated quantities (J or UJ) with a likely low bias.

#### 2. Initial Calibration: Acceptable.

Calculations were verified as correct. All relative percent differences (RPDs) were less than or equal to the laboratory control limits.

## 3. Continuing Calibration: Acceptable.

Calculations were verified as correct. All percent differences were less than or equal to the

#### laboratory control limits.

#### 4. Error Determination: Not Performed.

Samples necessary for bias and precision determination were not provided to the laboratory. All samples were flagged RND (Recovery Not Determined) and PND (Precision Not Determined), although the flags are not found on the Form I's.

# 5. Blanks: Acceptable.

A method blank was analyzed at the required frequency of every 12 hours for each matrix, preparation technique, and analysis system. Gasoline-range organics were not detected in any blank.

## 6. System Monitoring Compounds (SMC): Acceptable.

All recoveries of the SMCs were greater than 10% and within QC criteria.

#### 7. Performance Evaluation Samples: Not Provided.

Performance evaluation samples were not provided to the laboratory.

#### 8. Matrix and Blank Spikes: Acceptable.

Matrix and blank spike results were within laboratory QC limits.

#### 9. Duplicates: Acceptable.

Laboratory duplicate results were within laboratory QC limits.

## 10. Quantitation and Quantitation Limits: Acceptable.

Sample quantitation and sample quantitation limits were correctly calculated.

#### 12. Laboratory Contact: Not Required.

No laboratory contact was required.

#### 13. Overall Assessment of Data for Use

The overall usefulness of the data is based on the criteria outlined in the site-specific sampling plan Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Directive "Quality Assurance/Quality Control Guidance for Removal Activities, Data Validation Procedures" (EPA/540/G-90/004) and the analytical method. Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

#### Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

- JQ The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).
- N The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID:	15244116					
Lab Sample ID: Client Matrix:	580-51018-1 Water					npled: 06/17/2015 1440 ceived: 06/20/2015 1045
		AK101 Alaska - Gasol	ine Range O	rganics	(GC)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK101 5030B 1.0 07/03/2015 1709 07/03/2015 1709	Analysis Batch:	580-193957 N/A	1	nstrument ID: nitial Weight/Volume: Final Weight/Volume: njection Volume: Result Type:	SEA006 5 mL 5 mL PRIMARY
Analyte		Result (n	ng/L)	Qualifie	MDL	RL

Analyte	Result (mg/L)	Qyalifier	MDL	RL
Gasoline Range Organics (GRO)-C6-C10	Mgm-	MAM	0.015	0.050 US
Surrogate	%Rec	Qualifier	Accepta	ance Limits
Trifluorotoluene (Surr)	106	то выполнители и во сели и полнители и полнители и транители и транители и транители и полнители и п		) In 2014 nutrielle entrementen entstelle entrementen entrementen im mener en en en entrementen en en en en en en
4-Bromofluorobenzene (Surr)	93		50 - 150	)

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Job Number: 580-51018-1

# Client: Ecology and Environment, Inc.

Client Sample ID:

Lab Sample ID:

Client Matrix:

# 15244117 Date Sampled: 06/17/2015 1510 580-51018-2 Date Sampled: 06/20/2015 1510 Water Date Received: 06/20/2015 1045

	AK1	101 Alaska - Gasol	ine Range C	Organics	s (GC)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK101 5030B 1.0 07/03/2015 1741 07/03/2015 1741	Analysis Batch:	580-19395 N/A	7		eight/Volume: ight/Volume: Volume:	SEA006 5 mL 5 mL 5 mL PRIMARY
Analyte		Result (n	ng/L)	Qualifi	er	MDL	RL
Gasoline Range C	Organics (GRO)-C6-C10	NOM		HAN	general and beneralized in a subsection	0.015	0.050
Surrogate		%Rec		Qualifi	er	Acceptar	nce Limits
Trifluorotoluene (S	Surr)	100	inderfasionen, Kangerreis og	ing mening for fairing managementation	1975 - York Carlot and Carlot Carlot	50 - 150	na manana manana manang kanang manana kanana manana kanana kanang manana kanana kanang manana kanang manana ka Manana kang manana kanana kanang kanana kanang kanana kanang manana kanang manana kanang manana kanang manana ka
4-Bromofluoroben	zene (Surr)	94				50 - 150	

07/27/2015

Job Number: 580-51018-1

50 - 150

Client: Ecology and Environment, Inc.

4-Bromofluorobenzene (Surr)

**Client Sample ID:** 15244118 Lab Sample ID: 580-51018-3 Date Sampled: 06/17/2015 1600 **Client Matrix:** Water Date Received: 06/20/2015 1045 AK101 Alaska - Gasoline Range Organics (GC) Analysis Method: AK101 Analysis Batch: 580-193957 Instrument ID: SEA006 Prep Method: 5030B N/A Initial Weight/Volume: 5 mL Dilution: Final Weight/Volume: 1.0 5 mL Analysis Date: 07/03/2015 1815 Injection Volume: 5 mL Prep Date: 07/03/2015 1815 Result Type: PRIMARY Analyte Result (mg/L) Qualifier MDL RL Gasoline Range Organics (GRO)-C6-C10 0.015 0.050 Have NEhr %Rec Surrogate Qualifier Acceptance Limits Trifluorotoluene (Surr) 50 - 150 103

94

Client: Ecology and Environment, Inc.

4-Bromofluorobenzene (Surr)

#### / mary nour bata

Job Number: 580-51018-1

50 - 150

Client Sample ID:	15244119					
Lab Sample ID: Client Matrix:	580-51018-4 Water					npled: 06/17/2015 1515 ceived: 06/20/2015 1045
	AK	101 Alaska - Gasol	ine Range (	Organics	; (GC)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK101 5030B 1.0 07/03/2015 1847 07/03/2015 1847	Analysis Batch:	580-19395 N/A	57	Instrument ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume: Result Type:	SEA006 5 mL 5 mL 5 mL PRIMARY
Analyte	na mana ana ana amin'ny fisia mandrona mandrona mandrona mandrona mandrona mandrona mandrona mandrona mandrona Na fisia mandrona mand	Result (n	ng/L)	Qualifie		
Gasoline Range O	rganics (GRO)-C6-C10	2MP/14		Mu	0.015	0.050
Surrogate		%Rec		Qualifie	er Acceptar	nce Limits
Trifluorotoluene (S	urr)	103	e et autoria de la constituir de la constit	1999-1997 - 1996 - 1997 - 1998 - 1997 - 1998 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1	50 - 150	an na manana ana manana ana ana ana ana

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MWZ

Job Number: 580-51018-1

50 - 150

#### Client: Ecology and Environment, Inc.

4-Bromofluorobenzene (Surr)

#### **Client Sample ID:** 15244120 Lab Sample ID: 580-51018-5 Date Sampled: 06/18/2015 1230 Client Matrix: Water Date Received: 06/20/2015 1045 AK101 Alaska - Gasoline Range Organics (GC) Instrument ID: Analysis Method: AK101 Analysis Batch: 580-193957 SEA006 Initial Weight/Volume: 5 mL Prep Method: 5030B N/A Dilution: Final Weight/Volume: 1.0 5 mL Analysis Date: 07/03/2015 1953 Injection Volume: 5 mL Prep Date: 07/03/2015 1953 Result Type: PRIMARY Reşult (mg/L) Qualifier MDL Analyte RL Gasoline Range Organics (GRO)-C6-C10 0.015 0.050 NAMIN An Surrogate %Rec Qualifier Acceptance Limits Trifluorotoluene (Surr) 50 - 150 83

94

# Client: Ecology and Environment, Inc.

4-Bromofluorobenzene (Surr)

# Job Number: 580-51018-1

50 - 150

Client Sample ID:	: 15244121						
Lab Sample ID:	580-51018-6						npled: 06/17/2015 1440
Client Matrix:	Water					Date Rec	ceived: 06/20/2015 1045
	AK	101 Alaska - Gasol	ine Range	Organic	s (GC)		
Analysis Method:	AK101	Analysis Batch: 580-193957		Instrument I	D:	SEA006	
Prep Method:	5030B		N/A		Initial Weight/Volume:		5 mL
Dilution:	1.0				Final Weigh	t/Volume:	5 mL
Analysis Date:	07/03/2015 2026				Injection Vo	lume:	5 mL
Prep Date:	07/03/2015 2026				Result Type		PRIMARY
Analyte		Result (n	ng/L)	Qualifi	er ME	DL	RL
Gasoline Range C	Gasoline Range Organics (GRO)-C6-C10		NOME		0.0	)15	0.050 UT
Surrogate		%Rec		Qualifi	er	Acceptan	ice Limits
Trifluorotoluene (S	surr)	99	olar totaliy ole follow of colorado to	ann fra an an an ann a' fhairtean an a	Manurés vésztér az méter éssztéretére és pétér	50 - 150	na na farana na

94

# Client: Ecology and Environment, Inc.

Client Sample ID	15244122							
Lab Sample ID: Client Matrix:								
AK101 Alaska - Gasoline Range Organics (GC)								
Analysis Method:	AK101	Analysis Batch:	580-193957	Instrument ID:	SEA006			
Prep Method:	5030B		N/A	Initial Weight/Volume:	5 mL			
Dilution:	1.0			Final Weight/Volume:	5 mL			
Analysis Date:	07/03/2015 2059			Injection Volume:	5 mL			
Prep Date:	07/03/2015 2059			Result Type:	PRIMARY			

Prep Date: 07/0	3/2015 2059		Rest	ilt Type:	PRIMARY	
Analyte		Result (mg/L)	Qualifier	MDL	RL	
Gasoline Range Organi	cs (GRO)-C6-C10	MAN	MAN	0.015	0.050 UJ	
Surrogate		%Rec	Qualifier	Acceptance Limits		
Trifluorotoluene (Surr)	fisiβn af hilfs an ent source diametric fan 'n stader af de reaser on de Marier e Proverland steller ble	100	nd af brander felter af en de ser de ser de ser de ser en en en de ser de se en de ser de ser de ser de ser de	50 - 15	50	1.54
4-Bromofluorobenzene	(Surr)	95		50 - 15	50	

07/27/2015

Job Number: 580-51018-1

#### Client: Ecology and Environment, Inc.

#### Client Sample ID: 15244123 Lab Sample ID: 580-51018-8 Date Sampled: 06/17/2015 1400 Client Matrix: Water Date Received: 06/20/2015 1045 AK101 Alaska - Gasoline Range Organics (GC) Analysis Method: AK101 Analysis Batch: 580-193957 Instrument ID: SEA006 Prep Method: 5030B Initial Weight/Volume: 5 mL N/A Dilution: Final Weight/Volume: 5 mL 1.0 Analysis Date: 07/03/2015 2132 Injection Volume 5 ml

Result Type: PRIMARY	
HM 0.015 0.050 UT	
Qualifier Acceptance Limits	
а с попротителя и полното на полното со полното на полното на поред с поредение во протителя на с поред на поред на поред на слад. 50 – 150	
50 - 150	
	Result Type: PRIMARY ) Qualifier MDL RL HM 0.015 0.050 UT Qualifier Acceptance Limits 50 - 150

MW 07/27/2015

Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244124 Lab Sample ID: 580-51018-9 Date Sampled: 06/17/2015 1410 **Client Matrix:** Water Date Received: 06/20/2015 1045 AK101 Alaska - Gasoline Range Organics (GC) Analysis Method: AK101 Analysis Batch: 580-193957 Instrument ID: SEA006 Prep Method: 5030B N/A Initial Weight/Volume: 5 mL Dilution: 1.0 Final Weight/Volume: 5 mL Analysis Date: 07/03/2015 2205 Injection Volume: 5 mL Prep Date: 07/03/2015 2205 Result Type: PRIMARY Analyte Result (mg/L) Qualifier MDL RL Gasoline Range Organics (GRO)-C6-C10 0.015 0.050 MAN HAN %Rec Qualifier Surrogate Acceptance Limits Trifluorotoluene (Surr) 50 - 150 101 4-Bromofluorobenzene (Surr) 94 50 - 150

Mw 7-30-15

# Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID	15244101					
Lab Sample ID: Client Matrix:	580-51018-10 Solid	% Moisture	e: 26.7			mpled: 06/17/2015 0940 ceived: 06/20/2015 1045
	AK	101 Alaska - Gasol	ine Range (	Organics	(GC)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK101 5035 1.0 07/08/2015 2242 06/25/2015 1526	Analysis Batch: Prep Batch:	580-19431 580-19432	28	Instrument ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume: Result Type:	TAC056 5.349 g 5 mL 5 mL PRIMARY
Analyte	DryWt Corrected	I: Y Result (n	ng/Kg)	Qualifie	r MDL	RL
Gasoline Range C	organics (GRO)-C6-C10	1.5 1.5	Brown Counter State of Stationary Society in Society	JQ	0.82	6.6
Surrogate		%Rec		Qualifie	r Acceptar	nce Limits
Trifluorotoluene (S 4-Bromofluoroben	,	100 91	from Number of a second factor of the South Sou	M C 144, 1759, 1299, 1299, 1294, 1	50 - 150 50 - 150	nadima din kana mana kana kana kana kana kana kan

MW 7-30-15

# Client: Ecology and Environment, Inc.

Client Sample ID	15244102					
Lab Sample ID: Client Matrix:	580-51018-11 Solid	% Moisture	e: 22.7			mpled: 06/17/2015 1017 ceived: 06/20/2015 1045
	AK1	01 Alaska - Gasol	ine Range (	Organics	s (GC)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK101 5035 1.0 07/08/2015 2038 06/25/2015 1526	Analysis Batch: Prep Batch:	580-19431 580-19432		Instrument ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume: Result Type:	TAC056 4.227 g 5 mL 5 mL PRIMARY
Analyte	DryWt Corrected:	Y Result (n	ng/Kg)	Qualifie	er MDL	RL
Gasoline Range C	organics (GRO)-C6-C10	2.6	2 MT2 15 802 ST MT2 STREET - 2-1 HELDS	JQ	0.91	7.3
Surrogate Trifluorotoluene (S 4-Bromofluoroben		%Rec 109 90	i Daufaan ya waxaa ya ka	Qualifie	er Acceptai 50 - 150 50 - 150	

Mug-30-15 07/27/2015

Job Number: 580-51018-1

#### Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244103 Lab Sample ID: 580-51018-12 Date Sampled: 06/17/2015 1130 **Client Matrix:** Solid % Moisture: 51.5 Date Received: 06/20/2015 1045 AK101 Alaska - Gasoline Range Organics (GC) Analysis Method: AK101 Analysis Batch: 580-194318 Instrument ID: **TAC056** Prep Method: 5035 Prep Batch: 580-194328 Initial Weight/Volume: 4.573 g Final Weight/Volume: Dilution: 1.0 5 mL 07/08/2015 2109 Analysis Date: Injection Volume: 5 mL 06/25/2015 1526 Prep Date: Result Type: PRIMARY DryWt Corrected: Y Analyte Result (mg/Kg) Qualifier MDL RL Gasoline Range Organics (GRO)-C6-C10 NOM 1.7 13 Surrogate %Rec Qualifier Acceptance Limits Trifluorotoluene (Surr) 106 50 - 150 4-Bromofluorobenzene (Surr) 89 50 - 150

MW-7-30-15 07/27/2015

# Client: Ecology and Environment, Inc.

Client Sample ID	15244104					
Lab Sample ID: Client Matrix:	580-51018-13 Solid	% Moisture	e: 77.8			npled: 06/17/2015 1210 ceived: 06/20/2015 1045
	AK	101 Alaska - Gasol	ine Range C	rganics (	(GC)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK101 5035 1.0 07/08/2015 2140 06/25/2015 1526	Analysis Batch: Prep Batch:	580-19431 580-19432	8 li F Ii	nstrument ID: nitial Weight/Volume: Final Weight/Volume: njection Volume: Result Type:	TAC056 3.362 g 5 mL 5 mL PRIMARY
Analyte	DryWt Corrected	d: Y Result (n	ng/Kg)	Qualifier	MDL	RL ,
Gasoline Range C	organics (GRO)-C6-C10	NAN	annouge i na -7,744 a taointeachadh	ander de les entres en en antalises	5.1	41 (J
Surrogate		%Rec		Qualifier	Acceptar	nce Limits
Trifluorotoluene (S 4-Bromofluoroben		. 106 87	alla kunistrad di Anni ostiki kulondana	an la faran da an ann ann ann ann ann ann ann ann	50 - 150 50 - 150	anna an shekararar na hararar shekarar

My 30-15 07/27/2015

Client: Ecology and Environment, Inc.

Client Sample ID:	15244105					
Lab Sample ID: Client Matrix:	580-51018-14 Solid	% Moistur	e: 63.9			mpled: 06/17/2015 1630 ceived: 06/20/2015 1045
	AK1	01 Alaska - Gasol	ine Range (	Organics	; (GC)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK101 5035 1.0 07/08/2015 2211 06/25/2015 1526	Analysis Batch: Prep Batch:	580-19431 580-19432		Instrument ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume: Result Type:	TAC056 3.531 g 5 mL 5 mL PRIMARY
Analyte Gasoline Range C	DryWt Corrected: Organics (GRO)-C6-C10	Y Result (n	ng/Kg)	Qualifie	er MDL 2.8	RL 23 //
Surrogate Trifluorotoluene (S 4-Bromofluoroben	2	%Rec 105 89	ir samilaansi an shiftiilii 16. huuldii ahtarasiinad	Qualifie	er Acceptar 50 - 150 50 - 150	nce Limits

Mw 7-30-15 07/27/2015

Client: Ecology and Environment, Inc.

Job Number: 580-51018-1

Client Sample ID:	15244114						
Lab Sample ID: Client Matrix:	580-51018-15 Solid						npled: 06/17/2015 0001 ceived: 06/20/2015 1045
	AK1	01 Alaska - Gaso	line Range C	Organic	s (GC)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	AK101 5035 1.0 07/08/2015 1802 06/25/2015 1527	Analysis Batch: Prep Batch:	580-19431 580-19432		Instrument Initial Weig Final Weig Injection Vo Result Typ	ht/Volume: ht/Volume: olume:	TAC056 25 g 25 mL 5 mL PRIMARY
Analyte	DryWt Corrected:	N Result (r	ng/Kg)	Qualifi	er M	DL	RL
Gasoline Range C	rganics (GRO)-C6-C10	7.9	n a na managana an ana ang ang ang ang ang ang a		0.	50	4.0
Surrogate		%Rec	an experimental first and their as we can be	Qualifi	er	Acceptar	ice Limits
Trifluorotoluene (S 4-Bromofluoroben	2	119 91				50 - 150 50 - 150	n - and an an annual second a second second of 17000 (spacing respective) 1800

Mw 7-30

ecology and environment, inc.

Global Environmental Specialists 720 Third Avenue, Suite 1700 Seattle, Washington 98104

Tel: (206) 624-9537, Fax: (206) 621-9832

#### MEMORANDUM

DATE:	July 30, 2015		58 - 12
TO:	Linda Ader, START-IV Pro	ject Manager, E & E, Scattle, WA	
FROM:	Mark Woodke, START-IV	Chemist, E & E, Seattle, Washington M	Nº
SUBJ:	Organic Data Quality Ass Holy Cross-AK Big Lake		S period a
REF:	TDD: 14-08-0001	PAN: 1004530.0005.013.01	

The data quality assurance review of 5 soil and 7 water samples collected from the Holy Cross-AK Big-Lake site located in Holy Cross, Alaska, has been completed. Semivolatile Organic Compound (SVOC) analysis (EPA Method 8270) was performed by Test America, Inc., Tacoma, WA. All sample analyses were evaluated following EPA's Stage 2B and/or 4 Data Validation Electronic and/or Manual Process (S2/4VE/M).

The samples were numbered:

15244116	15244117	15244118	15244119	15244120
15244121	15244122	15244101	15244102	15244103
15244104	15244105			

Data Qualifications:

#### 1. Sample Holding Times: Acceptable.

The samples were maintained and received within the QC limits of  $< 6^{\circ}$ C. The samples were collected on June 17 and 18, 2015, were extracted on June 24 or 30, 2015, and were analyzed by July 7, 2015, therefore meeting holding time criteria of less than 7 days between collection and extraction (14 days for soif) and less than 40 days between extraction and analysis.

2. Tuning: Acceptable.

Tuning was performed at the beginning of each 12-hour analysis sequence. All results were within QC limits.

3. Initial Calibration: Acceptable.

All average Relative Response Factors (RRFs) were within the QC limits. All Relative Standard Deviations (RSDs) were within the QC limits.

#### 4. Continuing Calibration: Acceptable.

All RRFs were within the QC limits. All % differences were within the QC limits.

#### 5. Blanks: Acceptable.

A method blank was analyzed for each 20 sample batch per matrix. There were no detections in any method blank.

# 6. System Monitoring Compounds (SMCs): Acceptable.

All SMC recoveries were within QC limits.

#### 7. Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Analysis: Satisfactory.

All spike analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. All recoveries were within the QC limits except several outliers in the soil MS and MSD; positive results for acenaphthylene, acenaphthene, phenanthrene, fluoranthene, pyrene, benzo(a) anthracene, and chrysene in sample 15244101 were qualified as estimated quantities (J).

## 8. Duplicate Analysis: Satisfactory.

Blank spike duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All spike duplicate results were within QC limits except the several soil matrix spike outliers (phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, and benzo(a)pyrene; associated positive results in sample 15244101 were qualified as estimated quantities (J)) and the water benzo[a]pyrene blank spike result. The water sample positive benzo(a)pyrene results were qualified as estimated quantities (J).

## 9. Internal Standards: Acceptable.

All internal standards (IS) were within  $\pm$  30 seconds of the continuing calibration IS retention times. All area counts were within 50 % to 200 % of the continuing calibration area counts.

## 10. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

#### 11. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

#### 12. Overall Assessment of Data for Use

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical method, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

- U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- JQ The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).
- N The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Client: Ecology and Environment, Inc.

Client Sample ID:	15244116	
Lab Sample ID:	580-51018-1	Date Sampled: 06/17/2015 1440
Client Matrix:	Water	Date Received: 06/20/2015 1045
	8270D SIM Semivolatile Organic Compounds (GC/MS SIM	)

ozrob om dennvolatie organic compounds (donno sim)							
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8270D SIM 3520C 1.0 07/07/2015 1526 06/24/2015 1926	Analysis Batch: Prep Batch:	580-194108 580-193154	Lab I Initia Final	ument ID: File ID: I Weight/Volume: Weight/Volume: tion Volume:	TAC023 0707A018.D 951 mL 2.0 mL 1 uL	
Analyte		Result (u	ig/L)	Qualifier	MDL	RL	
Naphthalene 2-Methylnaphthale 1-Methylnaphthale Acenaphthylene Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo[a]anthrace Chrysene Benzo[a]anthrace Benzo[b]fluoranthe Benzo[a]pyrene Indeno[1,2,3-cd]py Dibenz(a,h)anthra Benzo[g,h,i]peryle	ene ne ene ene yrene icene			Au	0.0076 0.0063	0.021 0.027 0.021	
Surrogate		%Rec		Qualifier	Acceptar	nce Limits	
Terphenyl-d14	naamaattada miliitta attala attala attala attala dalamad daret 1000 km/m amiliitta art	95	n af mar f na gala tha ann an fhair an tha an far an fa		64 - 150	dand of and any provided and the out that of the second second second second second second second second second	

MW730-15

Client: Ecology and Environment, Inc.

Client Sample ID:	15244117					
Lab Sample ID: Client Matrix:	580-51018-2 Water	Date Sampled: 06/17/2015 1510 Date Received: 06/20/2015 1045				
8270D SIM Semivolatile Organic Compounds (GC/MS SIM)						

	02100	Sim Serinvolatile Org	anic compoun	us (ocimo	Silwi)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8270D SIM 3520C 1.0 07/07/2015 1611 06/24/2015 1926	Analysis Batch: Prep Batch:	580-194108 580-193154	Lab Fi Initial Final \	nent ID: le ID: Weight/Volume: Neight/Volume: on Volume:	TAC023 0707A019.D 998.8 mL 2.0 mL 1 uL
Analyte		Result (u	ıg/L) Qi	ualifier	MDL	RL , A
Naphthalene	annan a' ann an ann an an an an an an an an an a	ND	an ya manazaran kuka manazaran dalar kuka t	Anton stranget of Fuger strangers	0.0072	0.020
2-Methylnaphthale	ene	ND		0.0060		0.026
1-Methylnaphthale	ene	ND		0.0060		0.020
Acenaphthylene		ND			0.0060	0.020
Acenaphthene		ND			0.0060	0.020
Fluorene		ND			0.0060	0.020
Phenanthrene		ND			0.0060	0.020
Anthracene		ND			0.0060	0.020
Fluoranthene		ŊD			0.0060	0.020
Pyrene		ND			0.0060	0.020
Benzo[a]anthracene		ND			0.0060	0.020
Chrysene		NP			0.0060	0.020
Benzo[b]fluoranth		ND			0.0060	0.020
Benzo[k]fluoranth	ene	ND	/	_	0.0060	0.020
Benzo[a]pyrene		ИР	7γι	lv	0.0060	0.020
Indeno[1,2,3-cd]p	2	NP			0.0060	0.020
Dibenz(a,h)anthra		NØ			0.0060	0.020
Benzo[g,h,i]peryle	ene	ND			0.0060	0.020 V
Surrogate		%Rec	Q	ualifier	The state of the s	nce Limits
Terphenyl-d14		96	and the second se	<ul> <li>A second set of a second could be reader.</li> </ul>	64 - 150	

11W 7-30-15 07/27/2015

Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID:	15244118	
Lab Sample ID: Client Matrix:	580-51018-3 Water	Date Sampled: 06/17/2015 1600 Date Received: 06/20/2015 1045
	8270D SIM Semivolatile Organic Compounds (GC/MS SIM)	

627 OD Sim Sernivolaule Organic Compounds (GC/MS Sim)						
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8270D SIM 3520C 1.0 07/07/2015 1633 06/24/2015 1926	Analysis Batch: Prep Batch:	580-194108 580-193154	Final W		TAC023 0707A020.D 1053.6 mL 2.0 mL 1 uL
Analyte		Result (u	ıg/L) Q	ualifier	MDL	RL
Naphthalene	er bande Bandeller for baken werden bindelle bet en deler an der selfer Bernetiken Bilter Berlin bei der beite	ND		and an include an and a second	0.0068	0.019
2-Methylnaphthale	ene	ND		0.0057		0.025
1-Methylnaphthale	ene	ND		0.0057		0.019
Acenaphthylene		ND		0.0057		0.019
Acenaphthene		ND			0.0057	0.019
Fluorene		ND			0.0057	0.019
Phenanthrene		ND			0.0057	0.019
Anthracene		ND			0.0057	0.019
Fluoranthene		ND			0.0057	0.019
Pyrene		ND			0.0057	0.019
Benzo[a]anthracene		ND			0.0057	0.019
Chrysene		ND			0.0057	0.019
Benzo[b]fluoranthene		ND			0.0057	0.019
Benzo[k]fluoranthene		ŊD		,	0.0057	0.019
Benzo[a]pyrene		NP	F &	are	0.0057	0.019
Indeno[1,2,3-cd]pyrene		NÞ		0.0057		0.019
Dibenz(a,h)anthracene		NØ			0.0057	0.019
Benzo[g,h,i]peryle	ne	ND.			0.0057	0.019 V
Surrogate		%Rec	Q	ualifier	Acceptar	ice Limits
Terphenyl-d14		93	i for an	64 - 150		ill na spanja na splatna na spranja na svoje na slovena s je na slovena s vrtan kon

MW730

Client: Ecology and Environment, Inc.

Client Sample ID:	15244119	
Lab Sample ID: Client Matrix:	580-51018-4 Water	Date Sampled: 06/17/2015 1515 Date Received: 06/20/2015 1045
	8270D SIM Semivolatile Organic Compounds (GC/MS SIM)	

8270D SIM Semivolatile Organic Compounds (GC/MS SIM)								
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8270D SIM 3520C 1.0 07/07/2015 06/24/2015		Analysis Batch: Prep Batch:	580-194108 580-193154	-	Final W		TAC023 0707A021.D 1025.6 mL 2.0 mL 1 uL
Analyte			Result (u	ig/L)	Qualif	ier	MDL	RL
Naphthalene	1979 - C. C. Martine & Martine and Martine 2019	in a Prijek wat sinds wij in nye nij sternigsproketsoor were pe	₿D		al and the second se		0.0070	0.020
2-Methylnaphthale	ene		ND					0.025
1-Methylnaphthale	ene		ND			0.0059		0.020
Acenaphthylene			ND			0.0059		0.020
Acenaphthene			ND				0.0059	0.020
Fluorene			ND				0.0059	0.020
Phenanthrene			ND				0.0059	0.020
Anthracene		ND				0.0059	0.020	
Fluoranthene		ND				0.0059	0.020	
Pyrene		ND				0.0059	0.020	
Benzo[a]anthracene		ήνD				0.0059	0.020	
Chrysene		ΝD		0.0059			0.020	
Benzo[b]fluoranthene		ήνD				0.0059	0.020	
Benzo[k]fluoranthene		ND		1		0.0059	0.020	
Benzo[a]pyrene		мþ		Xav		0.0059	0.020	
Indeno[1,2,3-cd]pyrene		ND				0.0059	0.020	
Dibenz(a,h)anthracene		ND				0.0059	0.020	
Benzo[g,h,i]peryle	ne		ND				0.0059	0.020
Surrogate		%Rec	%Rec 0		ier	Acceptar	nce Limits	
Terphenyl-d14		93	Norder and South of an out-source (Solar space of	64 - 150		dalahan na mutana mana mangaran na mutanan karan k		

MW 7-3045 07/27/2015

Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID:	15244120	
Lab Sample ID: Client Matrix:	580-51018-5 Water	Date Sampled: 06/18/2015 1230 Date Received: 06/20/2015 1045
	8270D SIM Semivolatile Organic Compounds (GC/MS	SIM)

		8270D SIM	Semivolatile Org	anic Compo	bunds	GC/INS S	51(VI)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8270D SIM 3520C 1.0 07/07/2015 06/24/2015		Analysis Batch: Prep Batch:	580-194108 580-193154		Final W		TAC023 0707A022.D 1037.2 mL 2.0 mL 1 uL	
Analyte			Result (u	g/L)	Qualif	ier	MDL	RL .	n
Naphthalene	n fan skrie an en de fan skrie an de fan	a de la desente de la composition de la	ND				0.0069	0.019	
2-Methylnaphthale	ene		ND				0.0058	0.025	, ,
1-Methylnaphthale			ND				0.0058	0.019	
Acenaphthylene			ND				0.0058	0.019	
Acenaphthene			ND				0.0058	0.019	
Fluorene			ND				0.0058	0.019	
Phenanthrene			ND				0.0058	0.019	
Anthracene			ND				0.0058	0.019	
Fluoranthene			ŅD				0.0058	0.019	
Pyrene			ND				0.0058	0.019	
Benzo[a]anthrace	ne		ŅD				0.0058	0.019	
Chrysene			ΝD				0.0058	0.019	
Benzo[b]fluoranth			ΝD				0.0058	0.019	
Benzo[k]fluoranthe	ene		Np		1		0.0058	0.019	
Benzo[a]pyrene			NP		Man		0.0058	0.019	
Indeno[1,2,3-cd]p			NØ		•		0.0058	0.019	
Dibenz(a,h)anthra			NĎ				0.0058	0.019	/
Benzo[g,h,i]peryle	ne		NOM				0.0058	0.019 💺	
Surrogate			%Rec		Qualif	fier		nce Limits	
Terphenyl-d14	**************************************		90	and the second			64 - 150	and a second	

MW 73015

Job Number: 580-51018-1

0.019

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Client: Ecology and Environment, Inc.

Fluorene

Pyrene

Chrysene

Phenanthrene

Anthracene

Fluoranthene

Benzo[a]anthracene

Benzo[b]fluoranthene

#### Client Sample ID: 15244121 Lab Sample ID: 580-51018-6 Date Sampled: 06/17/2015 1440 **Client Matrix:** Water Date Received: 06/20/2015 1045 8270D SIM Semivolatile Organic Compounds (GC/MS SIM) Analysis Method: 8270D SIM Analysis Batch: 580-194108 Instrument ID: **TAC023** Prep Method: 3520C Prep Batch: 580-193154 Lab File ID: 0707A025.D Dilution: 1.0 Initial Weight/Volume: 1044.7 mL Analysis Date: 07/07/2015 1823 Final Weight/Volume: 2.0 mL Prep Date: 06/24/2015 1926 Injection Volume: 1 uL Analyte Result (ug/L) Qualifier MDL RL Naphthalene 0.019 ND 0.0069 2-Methylnaphthalene 0.025 0.0057 1-Methylnaphthalene 0.0057 0.019 Acenaphthylene 0.0057 0.019 Acenaphthene 0.0057 0.019

Benzo[k]fluoranthene	NJD	/	0.0057	0.019	
Benzo[a]pyrene	ND	Apple	0.0057	0.019	
Indeno[1,2,3-cd]pyrene	NID		0.0057	0.019	
Dibenz(a,h)anthracene	NİÞ		0.0057	0.019	
Benzo[g,h,i]perylene	ND		0.0057	0.019	
Surrogate	%Rec	Qualifier	Accepta	nce Limits	
Terphenyl-d14	<b>80</b>	n de lan e rend als sonstellents en elsans, solstelle de lande robbe de rends	64 - 150	a fan an faffer yn farfer yn fan yn	/846-763

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ΝD

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MW 7-30-15 07/27/2015

Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244122 Lab Sample ID: 580-51018-7 Date Sampled: 06/17/2015 1535 **Client Matrix:** Water Date Received: 06/20/2015 1045 8270D SIM Semivolatile Organic Compounds (GC/MS SIM) Analysis Method: 8270D SIM Analysis Batch: 580-194108 Instrument ID: **TAC023** Prep Method: 3520C Prep Batch: 580-193154 Lab File ID: 0707A026.D Dilution: 1.0 Initial Weight/Volume: 1053.4 mL Analysis Date: 07/07/2015 1845 Final Weight/Volume: 2.0 mL Prep Date: 06/24/2015 1926 Injection Volume: 1 uL Analyte Result (ug/L) Qualifier MDL RL Naphthalene ND 0.0068 0.019 2-Methylnaphthalene ND 0.0057 0.025 1-Methylnaphthalene ND 0.019 0.0057 Acenaphthylene ND 0.0057 0.019 Acenaphthene ND 0.0057 0.019 Fluorene ND 0.0057 0.019 ND Phenanthrene 0.019 0.0057 Anthracene ND 0.019 0.0057 ND Fluoranthene 0.019 0.0057 ND 0.019 Pyrene 0.0057 Benzo[a]anthracene ND 0.019 0.0057 Chrysene ND 0.0057 0.019 Benzo[b]fluoranthene ND 0.0057 0.019 Benzo[k]fluoranthene ND 0.0057 0.019 Ina Benzo[a]pyrene ND 0.019 0.0057 NØ Indeno[1,2,3-cd]pyrene 0.0057 0.019 ND Dibenz(a,h)anthracene 0.0057 0.019 Benzo[g,h,i]perylene NE 0.0057 0.019 \ Surrogate %Rec Qualifier Acceptance Limits Terphenyl-d14 92 64 - 150

MW7-32

Client: Ecology and Environment, Inc.

### Job Number: 580-51018-1

Client Sample ID:	15244101				
Lab Sample ID: Client Matrix:	580-51018-10 Solid	% Moisture	: 26.7		mpled: 06/17/2015 0940 aceived: 06/20/2015 1045
	8270D SI	M Semivolatile Org	anic Compounds (	GC/MS SIM)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8270D SIM 3550B 1.0 07/02/2015 2125 06/30/2015 1229	Analysis Batch: Prep Batch:	580-193855 580-193625	Instrument ID: Lab File ID: Initial Weight/Volume Final Weight/Volume: Injection Volume:	0
Analyte	DryWt Correcte	d: Y Result (u	g/Kg) Qualifi	er MDL	RL
Naphthalene 2-Methylnaphthale 1-Methylnaphthale Acenaphthylene Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo[a]anthracel Chrysene Benzo[b]fluoranthe Benzo[k]fluoranthe Benzo[a]pyrene Indeno[1,2,3-cd]py Dibenz(a,h)anthra Benzo[g,h,i]peryle	ene ene ene vrene cene	ND W 4.7 ND W 2.2 2.8 36 3.1 48 35 21 26 26 26 12 18 11 4.2 9.3	JQ ++ w J D ++ 2 J D ++	<ul> <li>√Q</li> <li>1.0</li> <li>0.83</li> <li>№</li> <li>2.0</li> <li>0.98</li> <li>1.1</li> <li>2.0</li> <li>2.0</li> </ul>	13 6.6 13 6.6 6.6 13 6.6 6.6 13 13 6.6 13 13 6.6 13 13 6.6 13 13 6.6 13 13 13 6.6 13 13 13 13 6.6 13 13 13 13 13 13 13 13 13 13
Surrogate Terphenyl-d14	nondarin haad did aad yn orgen argender yn did yn aerodd yn ar gerad yn argender yn argender yn argender yn arg	9.3 %Rec 90	J Qualifi		ince Limits

MW 7-30-15

Job Number: 580-51018-1

### Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244102 Lab Sample ID: 580-51018-11 Date Sampled: 06/17/2015 1017 **Client Matrix:** Solid % Moisture: 22.7 Date Received: 06/20/2015 1045 8270D SIM Semivolatile Organic Compounds (GC/MS SIM) Analysis Method: 8270D SIM Analysis Batch: 580-193855 Instrument ID: **TAC023** Prep Method: Lab File ID: 3550B Prep Batch: 580-193625 0702A031.D Dilution: 1.0 Initial Weight/Volume: 10.146 g Analysis Date: 07/02/2015 2231 Final Weight/Volume: 10 mL 06/30/2015 1229 Prep Date: Injection Volume: 1 uL Analyte DryWt Corrected: Y Result (ug/Kg) Qualifier MDL RL Naphthalene ND 2.5 13 2-Methylnaphthalene lр 1.5 6.4 1-Methylnaphthalene NÞ 1.9 13 Acenaphthylene N 0.62 6.4 Acenaphthene NC 0.98 6.4 Fluorene 0.86 JR 0.80 6.4 Phenanthrene 4.9 1.9 13 Anthracene 0.99 0.94 6.4 Fluoranthene 2.6 6.4 1.1 Pyrene 3.0 1.9 13 Benzo[a]anthracene -NDW 1.9 13() Chrysene 2.7 1.1 6.4 Benzo[b]fluoranthene 2.2 1.9 13 Benzo[k]fluoranthene 13 V **WD** 1.9 Benzo[a]pyrene ND 1.2 6.4 Indeno[1,2,3-cd]pyrene ND 1.2 6.4 Dibenz(a,h)anthracene D 1.1 6.4 Benzo[g,h,i]perylene 1.9 13 Surrogate %Rec Qualifier Acceptance Limits

66

Terphenyl-d14

7MW 7-30

42 - 151

Client: Ecology and Environment, Inc.

Client Sample ID:	15244103				
Lab Sample ID: Client Matrix:	580-51018-12 Solid	% Moisture	9: 51.5		mpled: 06/17/2015 1130 ceived: 06/20/2015 1045
	8270D SI	M Semivolatile Org	anic Compounds (	GC/MS SIM)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8270D SIM 3550B 1.0 07/06/2015 1136 06/30/2015 1229	Analysis Batch: Prep Batch:	580-194026 580-193625	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume:	TAC023 0706A007.D 10.659 g 10 mL 1 uL
Analyte	DryWt Corrected	I: Y Result (u	g/Kg) Qualifi	er MDL	RL
Naphthalene 2-Methylnaphthale 1-Methylnaphthale Acenaphthylene Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo[a]anthracene Chrysene Benzo[b]fluoranthe Benzo[b]fluoranthe Benzo[a]pyrene Indeno[1,2,3-cd]py Dibenz(a,h)anthra Benzo[g,h,i]peryle	ne ene ene vrene cene	2.6 ND ND ND ND ND ND ND ND ND ND ND	્રવ્ ડ્વ ડ્વ	3.9 2.3 2.9 0.95 1.5 1.2 2.9 1.4 1.7 2.9 2.9 1.7 2.9 2.9 1.7 2.9 2.9 1.8 1.8 1.8 1.7 2.9	19 9.7 19 9.7 9.7 9.7 9.7 9.7 9.7 19 9.7 19 19 9.7 19 19 9.7 9.7 9.7 19 19 9.7 19
Surrogate Terphenyl-d14	n ann an i all chuir all dhairteach ann all a clàidh a dhannaichteac	%Rec 102	Qualifi	er Accepta 42 - 151	

MW 730-15

Client: Ecology and Environment, Inc.

Client Sample ID:	15244104				
Lab Sample ID: Client Matrix:	580-51018-13 Solid	% Moisture	ə: 77.8		Sampled: 06/17/2015 1210 Received: 06/20/2015 1045
	8270D SI	M Semivolatile Org	anic Compound	s (GC/MS SIM)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8270D SIM 3550B 1.0 07/06/2015 1158 06/30/2015 1229	Analysis Batch: Prep Batch:	580-194026 580-193625	Instrument ID: Lab File ID: Initial Weight/Volun Final Weight/Volum Injection Volume:	÷
Analyte	DryWt Corrected	:Y Result (u	g/Kg) Qua	alifier MDL	RL
Naphthalene 2-Methylnaphthale 1-Methylnaphthale Acenaphthylene Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo[a]anthracen Chrysene Benzo[b]fluoranthe Benzo[b]fluoranthe Benzo[a]pyrene Indeno[1,2,3-cd]py Dibenz(a,h)anthra Benzo[g,h,i]peryle	ne ene ene vrene cene	ND ND ND ND ND ND ND ND ND ND ND ND ND	JQ JQ	9.0 5.4 6.7 2.2 3.5 2.8 6.7 3.3 3.9 6.7 6.7 4.0 6.7 6.7 4.2 4.1 4.0 6.7	45 22 45 22 22 22 45 45 45 45 22 45 45 22 45 45 22 45 45 22 45 45 22 22 45 45 22 22 45 22 22 22 45 22 22 22 45 22 22 22 22 22 22 22 22 22 2
Surrogate		%Rec	Qu	alifier Accer	otance Limits
Terphenyl-d14	n na felan ola kina "Addan din Antonia ana sana kina katika kina na "Adam	83	dra. Pro effect da Polarizia II et tal alsa ana Minaria Milandri	42 - 1	

(NM 7-30-15

Client: Ecology and Environment, Inc.

### Job Number: 580-51018-1

Client Sample ID:	15244105				
Lab Sample ID: Client Matrix:	580-51018-14 Solid	% Moisture	: 63.9		mpled: 06/17/2015 1630 ceived: 06/20/2015 1045
	8270D SI	M Semivolatile Orga	anic Compounds (	GC/MS SIM)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8270D SIM 3550B 1.0 07/06/2015 1220 06/30/2015 1229	Analysis Batch: Prep Batch:	580-194026 580-193625	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume:	TAC023 0706A009.D 10.266 g 10 mL 1 uL
Analyte Naphthalene 2-Methylnaphthale 1-Methylnaphthale Acenaphthylene		d: Y Result (u <u>c</u> ND ND ND ND ND	ŋ/Kg) Qualifi	er MDL 5.4 3.2 4.0 1.3	RL 27 13 27 13
Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene		ND ND 7.6 NDT 2.4	JQ	2.1 1.7 4.0 2.0 2.3	13 13 27 13 13 13
Pyrene Benzo[a]anthracei Chrysene Benzo[b]fluoranthe Benzo[k]fluoranthe	ene	4.7 ND ND ND	jà	2.3 4.0 4.0 2.4 4.0 4.0	27 27 13 27 27 27
Benzo[a]pyrene Indeno[1,2,3-cd]py Dibenz(a,h)anthra Benzo[g,h,i]peryle	/rene cene			2.5 2.5 2.4 4.0	13 13 13 27
Surrogate Terphenyl-d14	n sana ay anin na anin'n antari na aninan'ny amin'ny fantan'ny fantana aminana	%Rec 87	Qualifi	er Accepta 42 - 151	

Mw 7-30-15

ecology and environment, inc.

Global Environmental Specialists

720 Third Avenue, Suite 1700 Seattle, Washington 98104 Tel: (206) 624-9537, Fax: (206) 621-9832

### MEMORANDUM

DATE:	July 30, 2015		
TO:	Linda Ader, START-IV Proj	ect Manager, E & E, Seattle, WA	
FROM:	Mark Woodke, START-IV	Chemist, E & E, Seattle, Washington	2
SUBJ:	Inorganic Data Quality As Holy Cross-AK Big Lake S		
REF	TDD: 14-08-0001	PAN: 1004530.0005.013.01	

The data quality assurance review of 5 soil and 7 water samples collected from the Holy Cross-AK Big Lake site located in Holy Cross, Alaska, has been completed. Target Analyte List (TAL) metals analyses (EPA Methods 6010C, 6020A, 7470A, and 7471A) were performed by Test America, Inc., Tacoma, WA. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

15244116	15244117	15244118	15244119	15244120
15244121	15244122	15244101	15244102	15244103
15244104	15244105			

### Data Qualifications:

### 1. Sample Holding Times: Acceptable.

All liquid samples were preserved to a pH < 2. The samples were maintained at <  $6^{\circ}$ C. The samples were collected on June 17 and 18, 2015, and were analyzed by July 15, 2015, therefore meeting QC criteria of less than 6 months between collection, extraction, and analysis (28 days for mercury).

### 2. Initial and Continuing Calibration: Acceptable.

A minimum of one calibration standard and a blank were analyzed at the beginning of the ICP analysis sequence and after every 10 samples. No results were greater than 110% of the highest calibration standard. All ICP recoveries were within the QC limits. All AA recoveries were within QC limits.

### 3. Blanks: Satisfactory.

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks that affected sample results except selenium (0.345 mg/kg) in the soil method blank; associated sample results less than five times the method blank result were qualified as not detected (U).

### 4. ICP Interference Check Sample: Acceptable.

An Interference Check Sample (ICS) was analyzed at the beginning and end of each sequence or at least twice every 8 hours, whichever was more frequent. All ICS (solution AB) results were within QC limits of 80% - 120% recovery.

### 5. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

### 6. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

### 7. ICP Serial Dilution: Acceptable.

A serial dilution analysis was performed per matrix per concentration or per sample delivery group, whichever was more frequent. All serial dilution results were within QC limits.

### 8. Matrix Spike Analysis: Satisfactory.

A matrix spike analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. Spike and spike duplicate recoveries were within the QC limits except copper (low recoveries) in the soil spike analyses. Copper soil results were qualified as estimated quantities (J or UJ) with a likely low bias.

### 9. Duplicate Analysis: Satisfactory.

A laboratory duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits except calcium in the soil duplicate analysis. Positive calcium results in the soil samples were qualified as estimated quantities (J) and have a likely unknown bias.

### 10. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

### 11. Overall Assessment of Data for Use

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

### Data Qualifiers and Definitions

- U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- JQ The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).
- N The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Client: Ecology and Environment, Inc.

Client Sample ID:	15244116				
Lab Sample ID: Client Matrix:	580-51018-1 Water				mpled: 06/17/2015 1440 ceived: 06/20/2015 1045
		6010C Metals (ICI	P)-Total Recovera	ible	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6010C 3005A 1.0 07/10/2015 1337 07/10/2015 0647	Analysis Batch: Prep Batch:	580-194560 580-194493	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC047 194443 475 482 493.a 50 mL 50 mL
Analyte		Result (n	ng/L) Qua		RL
Aluminum Calcium Iron Magnesium Potassium Sodium		ND/W/ 15 ND/W/ 1.8 2.0 1.0	JQ JQ	0.19 0.023 0.18 0.13 0.15 0.55	1.5 U 1.1 0.50 U 1.1 3.3 2.0
		6020A Metals (ICP/I	MS)-Total Recove	rable	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date: Analyte	6020A 3005A 5.0 07/10/2015 1607 07/10/2015 0647	Analysis Batch: Prep Batch: Result (n	580-194648 580-194493 ng/L) Qua		SEA044 054SMPL.D 50 mL 50 mL RL
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Nickel Selenium Silver Thallium Vanadium Zinc		ND ND ND ND ND ND ND ND ND ND ND ND ND N		0.00040 0.0014 0.00027 0.00051 0.00014 0.00016 0.0030 0.00017 0.0018 0.0020 0.0015 0.00015 0.00015 0.00071 0.0049 0.0095	0.0020 0.0050 0.0020 0.0020 0.0020 0.0020 0.0020 0.010 0.010 0.015 0.0050 0.0020 0.0050 0.020 0.020 0.020 0.0050 0.020 0.020
			rcury (CVAA)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	7470A 7470A 1.0 07/15/2015 1033 07/14/2015 1919	Analysis Batch: Prep Batch:	580-194954 580-194856	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC104 194846-TAC104-FCW 50 mL 50 mL
Analyte		Result (n			RL
Mercury		-NBMM		0.000041	0.00020
TestAmerica Sea	ttle	Page 2	63 of 5269	Mw	7-30-15 07/27/2015

Job Number: 580-51018-1

**Client Sample ID:** 15244117 Lab Sample ID: 580-51018-2 Date Sampled: 06/17/2015 1510 **Client Matrix:** Water Date Received: 06/20/2015 1045 6010C Metals (ICP)-Total Recoverable Analysis Method: 6010C Analysis Batch: 580-194560 Instrument ID: **TAC047** Lab File ID: Prep Method: 3005A Prep Batch: 580-194493 194443 475 482 493.a Dilution: Initial Weight/Volume: 50 mL 1.0 Analysis Date: 07/10/2015 1341 Final Weight/Volume: 50 mL 07/10/2015 0647 Prep Date: Result (mg/L) Qualifier MDL RL Analyte 1.5 U -NDM 0.19 Aluminum BALL Calcium 16 0.023 1.1 NOW 0.50() Iron 0.18 1.9 Magnesium 0.13 1.1 Potassium 2.1 0.15 3.3 Sodium 1.1 0.55 2.0 6020A Metals (ICP/MS)-Total Recoverable 580-194648 SEA044 Analysis Method: 6020A Analysis Batch: Instrument ID: 580-194493 Lab File ID: 055SMPL.D Prep Method: 3005A Prep Batch: 50 mL Dilution: 5.0 Initial Weight/Volume: 07/10/2015 1614 Analysis Date: Final Weight/Volume: 50 mL Prep Date: 07/10/2015 0647 Qualifier Result (mg/L) MDL RL Analyte 0.0020 U ND 0.00040 Antimony NDAN 0.0050 Arsenic 0.0014 0.012 0.0060 Barium 0.00027 Beryllium ND 0.00051 0.0020 ND 0.0020 Cadmium 0.00014 Chromium ΝD 0.00071 0.0020 ND Cobalt 0.00016 0.0020 NÞ Copper 0.0030 0.010 NDINV 0.0020 Lead 0.00017 0.020 Manganese 0.0018 0.010 0.015 U ŴD Nickel 0.0020 ND Selenium 0.0015 0.0050 Silver ND 0.00015 0.0020 Thallium ŊĎ 0.00071 0.0050 NDW Vanadium 0.0049 0.020 JQ Zinc 0.015 0.0095 0.035 7470A Mercury (CVAA) Analysis Method: 7470A Analysis Batch: 580-194954 Instrument ID: **TAC104** Prep Method: 7470A Prep Batch: 580-194856 Lab File ID: 194846-TAC104-FCW Dilution: 1.0 Initial Weight/Volume: 50 mL Final Weight/Volume: Analysis Date: 07/15/2015 1035 50 mL Prep Date: 07/14/2015 1919 Result (mg/L) Qualifier MDL Analyte RL 0.000041 0.00020 Mercury NOM Page 265 of 5269 07/27/2015 **TestAmerica Seattle** 

Client: Ecology and Environment, Inc.

1w730

Client: Ecology and Environment, Inc.

Client Sample ID:	15244118				
Lab Sample ID: Client Matrix:	580-51018-3 Water				mpled: 06/17/2015 1600 ceived: 06/20/2015 1045
		6010C Metals (ICF	P)-Total Recovera	ble	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6010C 3005A 1.0 07/10/2015 1344 07/10/2015 0647	Analysis Batch: Prep Batch:	580-194560 580-194493	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC047 194443 475 482 493.a 50 mL 50 mL
Analyte		Result (n	ng/L) Qual	ifier MDL	RL
Aluminum Calcium Iron Magnesium Potassium Sodium	nanna shina maraka nagara manasa shina sa sa sa sa	.NBW 15 ND WV 1.8 2.0 1.1	J C J C	0.19 0.023 0.18 0.13 0.15 0.55	1.5 U 1.1 0.50U 1.1 3.3 2.0
		6020A Metals (ICP/I	MS)-Total Recove	rable	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6020A 3005A 5.0 07/10/2015 1621 07/10/2015 0647	Analysis Batch: Prep Batch:	580-194648 580-194493	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	SEA044 056SMPL.D 50 mL 50 mL
Analyte		Result (n	ng/L) Qual	ifier MDL	RL
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Nickel Selenium Silver Thallium Vanadium Zinc		ND ND ND ND ND ND ND ND ND ND ND ND ND N		0.00040 0.0014 0.00027 0.00051 0.00014 0.00016 0.0030 0.00017 0.0018 0.0020 0.0015 0.00015 0.00015 0.00071 0.0049 0.0095	0.0020 0.0050 0.0060 0.0020 0.0020 0.0020 0.0020 0.0020 0.010 0.0020 0.015 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0010 0.0050 0.0020 0.0050 0.0020 0.0020 0.0050 0.0020 0.0020 0.0020 0.0050 0.0020 0.0020 0.0020 0.0050 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0050 0.0050 0.0050 0.0035 0.0050 0.0035 0.0050 0.0035 0.0050
			rcury (CVAA)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	7470A 7470A 1.0 07/15/2015 1056 07/14/2015 1919	Analysis Batch: Prep Batch:	580-194954 580-194856	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC104 194846-TAC104-FCW 50 mL 50 mL
Analyte Mercury	and Prada Prada Prana and Prada and Prada Pra	Result (n	ng/L) Qual	lifier MDL 0.000041	RL 0.00020
TestAmerica Sea	ittle	Page 2	67 of 5269		07/27/2015
				M	127-30-15

Client: Ecology and Environment, Inc.

Client Sample ID:	: 15244119				
Lab Sample ID: Client Matrix:	580-51018-4 Water				mpled: 06/17/2015 1515 ceived: 06/20/2015 1045
		6010C Metals (ICF	)-Total Recover	rable	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6010C 3005A 1.0 07/10/2015 1348 07/10/2015 0647	Analysis Batch: Prep Batch:	580-194560 580-194493	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	
Analyte		Result (m	ıg/L) Qu	alifier MDL	RL
Aluminum Calcium Iron Magnesium Potassium Sodium		NB(N) 15 ND(N) 1.8 2.0 1.0	, Дям Ј С Ј С	0.19 0.023 0.18 0.13 0.15 0.55	1.5 U 1.1 0.50 U 1.1 3.3 2.0
		6020A Metals (ICP/M	IS)-Total Recov	verable	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6020A 3005A 5.0 07/10/2015 1629 07/10/2015 0647	Analysis Batch: Prep Batch:	580-194648 580-194493	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	
Analyte Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Nickel Selenium Silver Thallium Vanadium Zinc	a Yafan ar Feshand Torra (Yarina An	Result (m ND ND ND ND ND ND ND ND ND ND ND ND ND	ng/L) Qu J(	0.0018 0.0020 0.0015 0.00015 0.00071 0.0049	RL 0.0020 0.0050 0.0050 0.0020 0.0020 0.0020 0.0020 0.0020 0.010 0.0020 0.015 0.0050 0.0050 0.0050 0.0020 0.0020 0.0020 0.0020 0.0035
P		7470A Me	rcury (CVAA)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	7470A 7470A 1.0 07/15/2015 1045 07/14/2015 1919	Analysis Batch: Prep Batch:	580-194954 580-194856	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	
Analyte	n - sang sang sang sang sang sang sang sang	Result (n	ng/L) Qu	alifier MDL	RL
Mercury TestAmerica Sea	ittle	Page 20	69 of 5269	0.000041 Mu	0.00020 07/27/2015 7-30-15

Client: Ecology and Environment, Inc.

Lab Sample ID:	580-51018-5				Date Sar	npled: 06/18/2015 1230
Client Matrix:	Water					ceived: 06/20/2015 1045
		6010C Metals (ICF	')-Total R	ecoverabl	e	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6010C 3005A 1.0 07/10/2015 1313 07/10/2015 0647	Analysis Batch: Prep Batch:	580-194 580-194		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC047 194443 475 482 493.a 50 mL 50 mL
Analyte		Result (m	ıg/L)	Qualifi	er MDL	RL
Aluminum Calcium Iron Magnesium	nannan shiring fan gan e folgeland fan gan gan gan gan gan gan	ND/M- 15 ND/M/ 1.8	and frank a second and a second and a	-BÁA	0.19 0.023 0.18 0.13	1.5 () 1.1 0.50 () 1.1
Potassium Sodium		2.0 1.0		5 L	0.15 0.55	3.3 2.0
		6020A Metals (ICP/I	NS)-Total	Recovera	ble	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6020A 3005A 5.0 07/10/2015 1508 07/10/2015 0647	Analysis Batch: Prep Batch:	580-194 580-194		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	SEA044 046SMPL.D 50 mL 50 mL
Analyte		Result (n	ng/L)	Qualifi	er MDL	RL ,
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Nickel Selenium Silver Thallium Vanadium Zinc		ND ND ND ND ND ND ND ND ND ND ND ND ND N		JQ	0.00040 0.0014 0.00027 0.00051 0.00014 0.00014 0.00016 0.00016 0.00017 0.0018 0.00017 0.0015 0.00015 0.00015 0.00015 0.00071 0.0049 0.0095	0.0020 0.0050 0.0060 0.0020 0.0020 0.0020 0.0020 0.010 0.015 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050
		7470A Me		-		710101
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	7470A 7470A 1.0 07/15/2015 1023 07/14/2015 1919	Analysis Batch: Prep Batch:	580-194 580-194		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC104 194846-TAC104-FCW 50 mL 50 mL
Analyte	د میرد (۱۹۹۵ میلید) در در در در در در در در در با در میرد میرو در میرو در میرد (۱۹۹۵ میل) در در در میرد میرد م مربح (۱۹۹۵ میل) میرد (۱۹۹۵ میل) در در در در در در در در میرو میرد (۱۹۹۵ میل) میرد (۱۹۹۵ میل) میرد (۱۹۹۵ میل) می	Result (n	ng/L)	Qualifi	and the international terror and a second state of a larger film. We determine the second state of a larger	RL
Mercury		DAPIN			0.000041	0.00020
TestAmerica Sea			71 of 526			07/27/2015

(MW7=30-15

### Client: Ecology and Environment, Inc.

Client Sample ID: Lab Sample ID: Client Matrix:	<b>15244121</b> 580-51018-6 Water					npled: 06/17/2015 1440 ceived: 06/20/2015 1045
		6010C Metals (ICF	P)-Total Recov	verabl	e	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6010C 3005A 1.0 07/10/2015 1351 07/10/2015 0647	Analysis Batch: Prep Batch:	580-194560 580-194493		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC047 194443 475 482 493.a 50 mL 50 mL
Analyte Aluminum Calcium Iron Magnesium Potassium Sodium		Result (m NDM 15 0.19 1.8 2.0 1.0	nine en e	Qualifie Frie I Q I Q I Q	er MDL 0.19 0.023 0.18 0.13 0.15 0.55	RL 1.5 U 1.1 0.50 1.1 3.3 2.0
		6020A Metals (ICP/I	VIS)-Total Rec	overa	ble	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6020A 3005A 5.0 07/10/2015 1636 07/10/2015 0647	Analysis Batch: Prep Batch:	580-194648 580-194493		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	SEA044 058SMPL.D 50 mL 50 mL
Analyte Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Nickel Selenium Silver Thallium Vanadium Zinc		Result (n ND NO n/W 0.012 ND ND ND ND ND ND ND ND ND ND ND ND ND		Qualifi	er MDL 0.00040 0.0014 0.00027 0.00051 0.00014 0.00071 0.00016 0.0030 0.00017 0.0018 0.0020 0.0015 0.00015 0.00071 0.0049 0.0095	RL 0.0020 0.0050 0.0060 0.0020 0.0020 0.0020 0.0020 0.0020 0.010 0.0020 0.015 0.0050 0.0050 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0050 0.0050 0.0050 0.0050 0.0020 0.0050 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.05
· · · · · ·		7470A Me	rcury (CVAA)		· · · · · · · · · · · · · · · · · · ·	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	7470A 7470A 1.0 07/15/2015 1047 07/14/2015 1919	Analysis Batch: Prep Batch:	580-194954 580-194856		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC104 194846-TAC104-FCW 50 mL 50 mL
Analyte	na ang kesi jung nikang kelang k	Result (n	ng/L) (	Qualifi	NAMES AND ADDRESS OF TAXABLE PARTY AND ADDRESS br>ADDRESS ADDRESS ADD	
Mercury		-AHD THE			0.000041	0.00020
TestAmerica Sea	ttle	Page 2	73 of 5269			07/27/2015

MW 7-30-15

Client: Ecology and Environment, Inc.

Client Sample ID: Lab Sample ID: Client Matrix:	580-51018-7 Water					npled: 06/17/2015 1535 ceived: 06/20/2015 1045
		6010C Metals (ICF	P)-Total Rec	overab	le	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6010C 3005A 1.0 07/10/2015 1354 07/10/2015 0647	Analysis Batch: Prep Batch:	580-194560 580-194493		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC047 194443 475 482 493.a 50 mL 50 mL
Analyte Aluminum Calcium Iron Magnesium Potassium Sodium		Result (n - <del>ND</del> /W 15 <del>ND</del> /W 1.9 2.1 1.1		Qualifi Bitiv JC JC	er MDL 0.19 0.023 0.18 0.13 0.15 0.55	RL 1.5 U 1.1 0.50 U 1.1 3.3 2.0
	6	6020A Metals (ICP/I	MS)-Total Re	ecovera	able	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date: Analyte Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Nickel Selenium Silver Thallium Vanadium Zinc	6020A 3005A 5.0 07/10/2015 1643 07/10/2015 0647	Analysis Batch: Prep Batch: Result (m ND ND ND ND ND ND ND ND ND ND ND ND ND	580-19464 580-19449		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume: er MDL 0.00040 0.0014 0.00027 0.00051 0.00014 0.00014 0.00016 0.0030 0.00017 0.0018 0.0020 0.0015 0.00015 0.00071 0.0049 0.0095	SEA044 059SMPL.D 50 mL 50 mL RL 0.0020 0.0050 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0020 0.0050 0.0020 0.0050 0
<del> </del>		7470.4 Ma				
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	7470A 7470A 1.0 07/15/2015 1049 07/14/2015 1919	Analysis Batch: Prep Batch:	rcury (CVAA 580-19495 580-19485	4	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC104 194846-TAC104-FCW 50 mL 50 mL
Analyte		Result (n	ng/L)	Qualifi	er MDL	RL
Mercury	n n han mit he gebrunden men under den sin sin sin der sin der eine der mehren der Alfreiche Auflichen eine Aus	MOTION	1999 - Sana Palanta Mandalan Indonésia	ter beneficien en ser en ser en	0.000041	0.00020
				07/27/2015		

MW7-30-15

Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244101 Lab Sample ID: 580-51018-10 Date Sampled: 06/17/2015 0940 **Client Matrix:** Solid % Moisture: 26.7 Date Received: 06/20/2015 1045 6010C Metals (ICP) Analysis Method: 6010C Analysis Batch: 580-195013 Instrument ID: **TAC047** 194829 900 865.asc Prep Method: 3050B Prep Batch: 580-194829 Lab File ID: Dilution: Initial Weight/Volume: 1.0 1.2698 g Analysis Date: 07/15/2015 1224 Final Weight/Volume: 50 mL Prep Date: 07/14/2015 1535 DryWt Corrected: Y Qualifier MDL RL Analyte Result (mg/Kg) Aluminum 14000 11 81 Calcium 9700 J.Faw 5.6 59 Iron 32000 6.0 27 Magnesium 8500 8.5 59 Potassium 820 17 180 Sodium 120 47 110 6020 Metals (ICP/MS) Analysis Method: 6020 Analysis Batch: 580-194965 Instrument ID: SEA103 Prep Method: 3050B Prep Batch: 580-194829 Lab File ID: 087SAMP.D Dilution: 10 Initial Weight/Volume: 1.2698 g Analysis Date: 07/15/2015 1348 Final Weight/Volume: 50 mL Prep Date: 07/14/2015 1535 DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL Analyte Arsenic 9.9 0.19 0.54 Antimony 0.29 0.045 0.21 Barium 110 0.084 0.54 Beryllium 0.74 0.038 0.21 Cadmium 0.60 0.020 0.21 Chromium 35 0.068 0.54 Cobalt 20 0.020 0.21 JATIW Copper 50 0.11 0.43 Lead 7.1 0.052 0.54 Manganese 1500 0.18 1.1 Nickel 37 0.087 0.54 Selenium 1.3 0.22 1.1 Silver 0.092 0.013 0.21 Thallium NDINU 0.14 0.43 Vanadium 60 0.51 2.1 100 Zinc 1.2 5.4 7471A Mercury (CVAA) Analysis Method: 7471A 580-194518 Analysis Batch: Instrument ID: **TAC103** Prep Method: 7471A Prep Batch: 580-194455 Lab File ID: 194455-TAC103-FCW Dilution: 0.8813 g 1.0 Initial Weight/Volume: 07/09/2015 1750 Analysis Date: Final Weight/Volume: 50 mL Prep Date: 07/09/2015 1449 Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL Mercury 0.052 0.0056 0.019 Page 277 of 5269 **TestAmerica Seattle** 07/27/2015

N 7-30-15

Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244102 Lab Sample ID: 580-51018-11 Date Sampled: 06/17/2015 1017 Client Matrix: Solid % Moisture: 22.7 Date Received: 06/20/2015 1045 6010C Metals (ICP) Analysis Batch: Analysis Method: 6010C 580-195013 Instrument ID: **TAC047** Prep Method: 3050B Prep Batch: 580-194829 Lab File ID: 194829 900 865.asc Dilution: 1.0 Initial Weight/Volume: 1.1255 g Analysis Date: Final Weight/Volume: 50 mL 07/15/2015 1250 07/14/2015 1535 Prep Date: Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL Aluminum 11000 11 86 J Calcium 4300 6.0 63 30000 29 Iron 6.4 Magnesium 7500 9.1 63 Potassium 580 18 190 Sodium 70 JQ 50 110 6020 Metals (ICP/MS) Analysis Method: 6020 Analysis Batch: 580-194965 Instrument ID: SEA103 Prep Method: 3050B Prep Batch: 580-194829 Lab File ID: 094SAMP.D Dilution: 10 Initial Weight/Volume: 1.1255 g Analysis Date: 07/15/2015 1416 Final Weight/Volume: 50 mL 07/14/2015 1535 Prep Date: Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL Arsenic 11 0.21 0.57 Antimony 0.26 0.048 0.23 Barium 71 0.090 0.57 Beryllium 0.45 0.040 0.23 Cadmium 0.35 0.022 0.23 Chromium 28 0.57 0.072 Cobalt 15 0.23 0.022 T Copper 39 0.11 0.46 Lead 6.4 0.055 0.57 Manganese 1100 0.20 1.1 Nickel 28 0.093 0.57 1.1 U Selenium 1.0 0.23 JBAN Silver 0.089 0.014 0.23 Q Thallium 0.46*U* NOM 0.15 Vanadium 48 0.54 2.3 Zinc 75 1.3 5.7 7471A Mercury (CVAA) Analysis Method: 7471A Analysis Batch: 580-194518 Instrument ID: **TAC103** Prep Method: 7471A Prep Batch: 580-194455 Lab File ID: 194455-TAC103-FCW Dilution: 1.0 Initial Weight/Volume: 0.6901 g Analysis Date: 07/09/2015 1800 Final Weight/Volume: 50 mL Prep Date: 07/09/2015 1449 Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL Mercury 0.018 JA 0.0067 0.022 **TestAmerica Seattle** Page 279 of 5269 07/27/2015

MW 7=30-15

Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

**Client Sample ID:** 15244103 Lab Sample ID: 580-51018-12 Date Sampled: 06/17/2015 1130 **Client Matrix:** Solid % Moisture: 51.5 Date Received: 06/20/2015 1045 6010C Metals (ICP) Analysis Method: 6010C Analysis Batch: 580-195013 Instrument ID: **TAC047** Prep Method: 3050B Prep Batch: 580-194829 Lab File ID: 194829 900 865.asc Dilution: 1.5209 g 1.0 Initial Weight/Volume: Analysis Date: 07/15/2015 1254 Final Weight/Volume: 50 mL Prep Date: 07/14/2015 1535 Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL Aluminum 12000 13 100 Calcium 4100 C 7.0 75 31000 Iron 7.6 34 Magnesium 7200 75 11 Potassium 760 22 220 Sodium 78 59 140 лQ 6020 Metals (ICP/MS) Analysis Method: 6020 Analysis Batch: 580-194965 Instrument ID: SEA103 Prep Method: 3050B Prep Batch: 580-194829 Lab File ID: 095SAMP.D Dilution: 1.5209 g 10 Initial Weight/Volume: Analysis Date: 07/15/2015 1420 Final Weight/Volume: 50 mL Prep Date: 07/14/2015 1535 Zinc 79 1.5 6.8 7471A Mercury (CVAA) Analysis Method: 7471A Analysis Batch: 580-194518 Instrument ID: **TAC103** Prep Method: 7471A Prep Batch: 580-194455 Lab File ID: 194455-TAC103-FCW Dilution: Initial Weight/Volume: 1.0 0.6181 g Analysis Date: 07/09/2015 1803 Final Weight/Volume: 50 mL Prep Date: 07/09/2015 1449 Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL Mercury 0.055 0.040 0.012 **TestAmerica Seattle** Page 281 of 5269 07/27/2015

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Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Arsenic	ana nanon'ny fisiana 60.5175. Ilay kaodim-ponentra dia dia faritr'i dia mampiha dia mampika dia mampika dia mam	10	na i nini filinar da nani lilan kuna nani na nani na ba	0.24	0.68
Antimony		0.32		0.057	0.27
Barium		84		0.11	0.68
Beryllium		0.49		0.047	0.27
Cadmium		0.31		0.026	0.27
Chromium		26		0.085	0.68
Cobalt		16	and the second second	0.026	0.27
Copper		48	3	0.13	0.54
Lead		6.3		0.065	0.68
Manganese		910		0.23	1.4
Nickel		31		0.11	0.68
Selenium		1.2	J-B @	0.27	1.4
Silver		0.068	JQ	0.016	0.27
Thallium		NOMV	-	0.18	0.54 / /
Vanadium		43		0.64	2.7

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Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244104 Lab Sample ID: 580-51018-13 Date Sampled: 06/17/2015 1210 Client Matrix: Solid % Moisture: 77.8 Date Received: 06/20/2015 1045 6010C Metals (ICP) Analysis Batch: Analysis Method: 6010C 580-195013 Instrument ID: **TAC047** Prep Method: 3050B Prep Batch: 580-194829 Lab File ID: 194829 900 865.asc Dilution: 1.0 Initial Weight/Volume: 1.4026 g Analysis Date: 07/15/2015 1256 50 mL Final Weight/Volume: Prep Date: 07/14/2015 1535 Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL Aluminum 9000 32 240 J Calcium 7200 17 180 Iron 22000 18 80 Magnesium 5200 25 180 Potassium 780 51 530 Sodium 320() -NDMV-140 6020 Metals (ICP/MS) Analysis Method: 6020 580-194965 Instrument ID: Analysis Batch: SEA103 Prep Method: 3050B Prep Batch: 580-194829 Lab File ID: 096SAMP.D Dilution: 10 Initial Weight/Volume: 1.4026 g Analysis Date: 07/15/2015 1424 Final Weight/Volume: 50 mL Prep Date: 07/14/2015 1535 Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL Arsenic 5.5 0.58 1.6 JQ Antimony 0.47 0.13 0.64 Barium 91 0.25 1.6 Beryllium 0.40 0.11 0.64 Cadmium 0.43 0.061 0.64 Chromium 18 0.20 1.6 Cobalt 10 0.061 0.64 Copper 35 0.31 1.3 Lead 5.6 0.15 1.6 Manganese 920 0.54 3.2 Nickel 22 0.26 1.6 3.2 **U** Selenium 44 LBM 0.65 0.087 Silver JQ 0.038 0.64 NDM-Thallium 1.3() 0.42 Vanadium 39 6.4 1.5 76 Zinc 3.6 16 7471A Mercury (CVAA) Analysis Method: 7471A Analysis Batch: 580-194518 Instrument ID: **TAC103** Prep Method: 7471A Prep Batch: 580-194455 Lab File ID: 194455-TAC103-FCW Dilution: Initial Weight/Volume: 1.0 0.7250 g 07/09/2015 1806 Analysis Date: Final Weight/Volume: 50 mL Prep Date: 07/09/2015 1449 Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL Mercury 0.047 0.074 JQ 0.022 **TestAmerica Seattle** Page 283 of 5269

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Client: Ecology and Environment, Inc.

Client Sample ID:	15244105					
Lab Sample ID:	580-51018-14					mpled: 06/17/2015 1630
Client Matrix:	Solid	% Moisture	9: 63.9		Date Re	ceived: 06/20/2015 1045
		6010C N	ietals (ICP)			
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6010C 3050B 1.0 07/15/2015 1259 07/14/2015 1535	Analysis Batch: Prep Batch:	580-19501 580-19482		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC047 194829 900 865.asc 1.3561 g 50 mL
Analyte	DryWt Corrected:	Y Result (m	ng/Kg)	Qualifi		RL
Aluminum Calcium Iron Magnesium Potassium Sodium		9800 7000 25000 5200 920 97	hadan yang kanala kanala sana	rQ D	20 11 11 16 33 89	150 110 51 110 340 200
		6020 Met	als (ICP/MS	)		· · · · · · · · · · · · · · · · · · ·
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	6020 3050B 10 07/15/2015 1429 07/14/2015 1535	Analysis Batch: Prep Batch:	580-19496 580-19482	5	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	SEA103 097SAMP.D 1.3561 g 50 mL
Analyte	DryWt Corrected:	bentlemented with all the strength and have been strength and the strength	ng/Kg)	Qualifi		RL
Arsenic Antimony Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Nickel Selenium Silver Thallium Vanadium Zinc		6.2 0.49 95 0.45 0.39 19 13 35 7.2 890 24 4.3 0.067 ND(M- 38 75		JC J	0.37 0.086 0.16 0.071 0.039 0.13 0.039 0.20 0.098 0.35 0.17 0.41 0.025 0.27 0.97 2.3	1.0 0.41 1.0 0.41 0.41 1.0 0.41 0.82 1.0 2.0 1.0 2.0 1.0 2.0 1.0 2.0 4.1 10
	7 4 7 4 4		rcury (CVA		In stress of UD	TA 0400
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	7471A 7471A 1.0 07/09/2015 1808 07/09/2015 1449	Analysis Batch: Prep Batch:	580-19451 580-19445		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	-
Analyte	DryWt Corrected:	Y Result (n	ng/Kg)	Qualif	ier MDL	RL
Mercury	nan nan na mananan karangan karangan karanan di karangan karangan karangan karangan karangan karangan karangan	0.075		1995 - 1999 - 1999 - 1995 - 1995	0.014	0.045
TestAmerica Sea	TestAmerica Seattle         Page 285 of 5269         07/27/2015					

MW 730-15

ecology and environment, inc. Global Environmental Specialists

720 Third Avenue, Suite 1700 Seattle, Washington 98104 Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: July 30, 2015

TO: Linda Ader, START-IV Project Manager, E & E, Seattle, WA

FROM: Mark Woodke, START-IV Chemist, E & E, Seattle, Washington

## SUBJ: Organic Data Quality Assurance Review, Holy Cross-AK Big Lake Site, Holy Cross, Alaska

REF: TDD: 14-08-0001

PAN: 1004530.0005.013.01

The data quality assurance review of 5 soil and 9 water samples collected from the Holy Cross-AX Big Lake site located in Holy Cross, Alaska, has been completed. Volatile Organic Compound (VOC) analysis (EPA Method 8260) was performed by Test America, Inc., Tacoma, WA. All sample analyses were evaluated following EPA's Stage 2B and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:1524411615244117152441181524411915244120152441211524412215244123152441241524410115244102152441031524410415244105

### Data Qualifications:

### 1. Sample Holding Times: Satisfactory.

The samples were maintained and received within the QC limits of < 6°C. The samples were collected on June 17 and 18, 2015, and were analyzed by July 9, 2015, therefore generally meeting QC criteria of less than 14 days between collection and analysis for soil and preserved water samples; samples that exceeded holding time limits (15244121, 15244122, 15244123 and 15244124) were qualified as estimated quantities (J or UJ) with a likely low bias. Samples 15244116, 15244117, 15244118, 15244119, 15244120, 15244121, 15244122, 15244124 were initially analyzed on an instrument that was not calibrated for tetrachloroethene. The samples were re-analyzed for tetrachloroethene outside of holding time and were qualified as estimated quantities (J or UJ) with a likely low bias.

### 2. Tuning: Acceptable.

Tuning was performed at the beginning of each 12-hour analysis sequence. All results were within QC limits.

### 3. Initial Calibration: Satisfactory.

All average Relative Response Factors (RRFs) were within the QC limits except vinyl chloride, bromomethane, and chloroethane associated with samples 15244101 through 15244105 and chloroethane associated with samples 15244116 through 15244124; associated positive sample results were qualified as estimated quantities (J) with a likely low bias and sample quantitation limits were rejected (R). All Relative Standard Deviations (RSDs) were within the QC limits.

### 4. Continuing Calibration: Satisfactory.

All RRFs were within the QC limits except chloroethane and bromomethane associated with samples 15244101 through 15244103 and chloroethane associated with samples 15244104, 15244105, and 15244116 through 15244124; associated positive sample results were qualified as estimated quantities (J) with a likely low bias and sample quantitation limits were rejected (R). All % differences were within the QC limits except low recoveries for dichlorodifluoromethane, chloromethane, and chloroethane associated with samples 15244101 through 15244105 and a low recovery for chloroethane and high recoveries for 1,1-dichloroethane, 2,2-dichloropropane, 1,1,1-trichloroethane, carbon tetrachloride, 1,1,1,2-tetra-chloroethane, 1,1,2,2,-tetrachloroethane, and hexachlorobutadiene associated with samples 15244116 through 15244124. No actions were taken based on the high recovery outliers as they were not detected in any associated samples. Positive results and sample quantitation limits for the low recovery outliers were qualified as estimated (J or UJ) with a likely low bias.

### 5. Blanks: Satisfactory.

A method blank was analyzed for each 20 sample batch per matrix. There were no detections in any method blank except 1,2,3-trichlorobenzene (4.22 ug/kg), ethylbenzene (2.60 ug/kg), m&p-xylenes (4.68 ug/kg), naphthalene (7.82 ug/kg), tetrachloroethene (5.39 ug/kg), toluene (3.47 ug/kg), and the TIC 1,2,3-trimethylbenzene (2.9 ug/kg) in the June 30, 2015, soil method blank. Associated sample results less than 5 times the blank contamination (10 times for common laboratory contaminants) were qualified as not detected (U).

### 6. System Monitoring Compounds (SMCs): Acceptable.

All SMC recoveries were within QC limits except a high recovery of dibromofluoromethane in sample 15244123 (tetrachloroethene only); no actions were taken since tetrachloroethene was not detected in the sample.

### 7. Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Analysis: Satisfactory.

MS and MSD analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. 1,1,2-Trichloroethane, 1,2,3-trichloropropane, 1,2-dibromoethane, 1,3-dichloropropane, chloroethane and trichlorofluoromethane had low recoveries associated with sample 15244122; associated positive results and sample quantitation limits were qualified as estimated quantities (J or UJ) in sample 15244122 with a likely low bias. Several analytes in the soil and water MS/MSD and water blank spike analyses had recoveries greater than QC limits; no actions were taken as none of these analytes were detected in the original samples.

### 8. Duplicate Analysis: Satisfactory.

Laboratory duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits except chloroethane in the water blank spike duplicate; positive water chloroethane results were qualified as estimated quantities (J) with a likely unknown bias.

### 9. Internal Standards: Acceptable.

All internal standards were within  $\pm$  30 seconds of the continuing calibration internal standard retention times. All area counts were within 50 % to 200 % of the continuing calibration area counts.

### 10. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

### 11. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

### 12. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical method, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

### Data Qualifiers and Definitions

U- The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- JQ The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).
- N The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

## Client: Ecology and Environment, Inc.

Client Sample ID:	15244116				
Lab Sample ID: Client Matrix:	580-51018-1 Water				npled: 06/17/2015 1440 eived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by G	C/MS	
Analysis Method:	8260C	Analysis Batch:	580-193774	Instrument ID:	TAC003
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	MS222579.D
Dilution:	1.0			Initial Weight/Volume:	10 mL
Analysis Date: Prep Date:	07/01/2015 2211 07/01/2015 2211			Final Weight/Volume:	10 mL °
Analyte		Result (u	ıg/L) Qualifi	er MDL	RL
1,1,1,2-Tetrachlor	pethane			0.48	2.0 0
1,1,1-Trichloroetha	ane	ND	ŧ	0.58	3.0
1,1,2,2-Tetrachlor	pethane	ND	t	0.24	1.0
1,1,2-Trichloroetha		ŊD		0.24	1.0
1,1-Dichloroethan		ND		0.44	2.0
1,1-Dichloroethen		ND	1	0.33	2.0
1,1-Dichloroprope		ND	ſ	0.50	3.0
1,2,3-Trichloroben		ND		0.32	2.0
1,2,3-Trichloropro		ND		0.41	2.0
1,2,4-Trichloroben				0.23	1.0 3.0
1,2,4-Trimethylber 1,2-Dibromo-3-Ch		ND		0.40	2.0
1,2-Dibromoethan		ND		0.40	1.0
1,2-Dichlorobenze		ND	*	0.35	2.0
1,2-Dichloroethan		ND	1	0.16	1.0
1,2-Dichloropropa		ND		0.18	1.0
1,3,5-Trimethylber		ND		0.50	3.0
1,3-Dichlorobenze		ND		0.44	2.0
1,3-Dichloropropa	ne	ND		0.15	1.0
1,4-Dichlorobenze	ene	ND	)	0.39	2.0
2,2-Dichloropropa	ne	ND	*	0.68	3.0
2-Chlorotoluene		ND	*	0.52	3.0
4-Chlorotoluene		ND		0.46	2.0
4-Isopropyltoluene	9	ND	1	0.53	3.0
Benzene		ND		0.42	2.0
Bromobenzene Bromochlorometh	000	ND		0.42 0.29	2.0 2.0
Bromodichlorome		ND	ļ	0.30	2.0
Bromoform	unane	ND		0.21	1.0
Bromomethane		ND		0.27	5.0
Carbon tetrachlori	de	ND	*	0.55	3.0
Chlorobenzene		ND	*	0.42	2.0 V O
Chloroethane		ND		0.40	50 MMK
Chloroform		ND		0.17	1.0 🖌
Chloromethane		ND		0.64	5.0
cis-1,2-Dichloroet		ND		0.21	1.0
cis-1,3-Dichloropr		ND	Ť	0.20	1.0
Dibromochlorome	thane	ND	mu	0.20	1.0
Dibromomethane	- 41	ND		0.14	1.0
Dichlorodifluorom	einane			0.31 0.51	2.0 3.0
Ethylbenzene	000			0.51	2.0
Hexachlorobutadi		ND ND		0.30	2.0
Isopropylbenzene Methyl tert-butyl e		ND ND		0.30	1.0
Methylene Chlorid		ND		1.3	5.0
m-Xylene & p-Xyl		ND		0.13	3.0
	- · · •	jur.	.4		<b>\$</b> 2
TestAmerica Sea	attle	Page 1	23 of 5269		07/27/2015

07/27/2015

Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244116 Lab Sample ID: 580-51018-1 Date Sampled: 06/17/2015 1440 Client Matrix: Water Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-193774 Instrument ID: **TAC003** Prep Method: 5030B Prep Batch: Lab File ID: MS222579.D N/A Dilution: 1.0 Initial Weight/Volume: 10 mL Analysis Date: 07/01/2015 2211 Final Weight/Volume: 10 mL Prep Date: 07/01/2015 2211 Analyte Result (ug/L) Qualifier MDL RL 2.0 ( Naphthalene ND 0.26 n-Butylbenzene ND 0.63 3.0 N-Propylbenzene ND 0.57 3.0 o-Xylene ND 0.49 2.0 sec-Butylbenzene ND 0.53 3.0 ND Styrene 0.62 5.0 ND t-Butylbenzene 0.53 3.0 ND 0.44 2.0 Toluene ΝD trans-1,2-Dichloroethene 0.24 1.0 Νþ trans-1,3-Dichloropropene 0.16 1.0 Trichloroethene NÞ 0.51 3.0 Diisopropyl ether NФ 0.12 1.0 ND Trichlorofluoromethane 0.63 3.0 ND Vinyl chloride 0.22 1.0 ND Ethyl t-butyl ether 0.34 5.0 ND 0.29 5.0 Tert-amyl methyl ether MA %Rec Qualifier Surrogate Acceptance Limits 1,2-Dichloroethane-d4 (Surr) 101 70 - 120 75 - 120 4-Bromofluorobenzene (Surr) 102 Dibromofluoromethane (Surr) 100 85 - 115 Toluene-d8 (Surr) 105 85 - 120 Trifluorotoluene (Surr) 99 70 - 136

07/27/2015 MM 7-38-15

Client: Ecology and Environment, Inc.

Client Sample ID:	15244116				
Lab Sample ID: Client Matrix:	580-51018-1 Water				mpled: 06/17/2015 1440 ceived: 06/20/2015 1045
	82	260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/01/2015 2211 07/01/2015 2211	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222579.D 10 mL 10 mL
Tentatively Ident	ified Compounds	Number TIC's F	ound: 0		
Cas Number	Analyte Tentatively Identified C	Compound		Est. Result (ug None	/L) Qualifier

07/27/2015 MW 7-20-15

### Client: Ecology and Environment, Inc.

Analysis Date:

#### Client Sample ID: 15244116 Lab Sample ID: 580-51018-1 Date Sampled: 06/17/2015 1440 Client Matrix: Water Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-194396 Instrument ID: TAC036 Prep Method: 5030B Prep Batch: N/A Lab File ID: hp359534.D Dilution: 1.0 Initial Weight/Volume: 5 mL 07/09/2015 2232

Prep Date:	07/09/2015 2232			-	
Analyte		Result (ug/L)	Qualifier	MDL	RL
Tetrachloroethene	) Antonio a construction of an antonio matrixe for construction of the state of an and Antonio a construction of an antonio matrixe for construction of the state of an and the state of an and the state of a	MBAN	H fine	0.75	3.00)
Surrogate		%Rec	Qualifier	Accepta	ance Limits
1,2-Dichloroethan	e-d4 (Surr)	85	and a first of the structure of the first of the first of the first of the structure of the	70 - 120	) 
4-Bromofluoroben	zene (Surr)	94		75 - 120	)
Dibromofluoromet	hane (Surr)	93		85 - 115	5
Toluene-d8 (Surr)		86		85 - 120	)
Trifluorotoluene (S	Surr)	102		70 - 136	3

Job Number: 580-51018-1

5 mL

Final Weight/Volume:

)//w7=30

Client: Ecology and Environment, Inc.

Client Sample ID:	: 15244117						
Lab Sample ID:	580-51018-2				Date Sar	npled: 06/1	7/2015 1510
Client Matrix:	Water				Date Red	ceived: 06/2	0/2015 1045
		8260C Volatile Organi	ic Compounds	by GC/MS	;		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/01/2015 2241 07/01/2015 2241	Analysis Batch: Prep Batch:	580-193774 N/A	Lab Initia	ument ID: File ID: I Weight/Volume: I Weight/Volume:	TAC003 MS22258 10 mL 10 mL	0.D
Analyte		Result (u	ig/L) G	Jualifier	MDL	RL	0
1,1,1,2-Tetrachlord 1,1,1-Trichloroetha 1,1,2-Trichloroetha 1,1,2-Trichloroetha 1,1-Dichloroethan 1,1-Dichloroethan 1,1-Dichloroprope 1,2,3-Trichloroprop 1,2,4-Trichloroben 1,2-Dibromo-3-Ch 1,2-Dibromo-3-Ch 1,2-Dibromo-3-Ch 1,2-Diblorobenze 1,2-Dichlorobenze 1,2-Dichlorobenze 1,2-Dichlorobenze 1,3-Dichlorobenze 2,2-Dichloropropa 1,4-Dichlorobenze 2,2-Dichloropropa 2-Chlorotoluene 4-Chlorotoluene 4-Isopropyltoluene Benzene Bromobenzene Bromodichlorometh Bromodichloromethane Carbon tetrachlori Chloroethane Chlorotofurene Chloroethane cis-1,2-Dichloropti Dibromochloromethane Dibromomethane Dibromomethane Dibromomethane Dibromomethane Dibromomethane Dibromomethane Dibromomethane Dibromomethane Dibromomethane Dibromomethane	ane oethane ane e e e ne zene pane zene loropropane e e ne e ne ne e ne ane ne de ane thane				0.48 0.58 0.24 0.24 0.44 0.33 0.50 0.32 0.41 0.23 0.50 0.40 0.15 0.35 0.16 0.18 0.50 0.44 0.15 0.39 0.68 0.52 0.46 0.53 0.42 0.42 0.42 0.29 0.30 0.21 0.27 0.55 0.42 0.42 0.42 0.29 0.30 0.21 0.27 0.55 0.42 0.42 0.42 0.29 0.30 0.21 0.27 0.55 0.42 0.42 0.42 0.29 0.30 0.21 0.27 0.55 0.42 0.42 0.42 0.29 0.30 0.21 0.27 0.55 0.42 0.42 0.42 0.42 0.29 0.30 0.21 0.27 0.55 0.42 0.42 0.42 0.29 0.30 0.21 0.27 0.55 0.42 0.42 0.42 0.42 0.42 0.27 0.55 0.42 0.42 0.42 0.27 0.55 0.42 0.42 0.42 0.55 0.55 0.55 0.52 0.55 0.42 0.55 0.55 0.55 0.52 0.55 0.55 0.55 0.52 0.55 0.55 0.52 0.55 0.55 0.55 0.52 0.55	$\begin{array}{c} 2.0\\ 3.0\\ 3.0\\ 1.0\\ 1.0\\ 2.0\\ 2.0\\ 2.0\\ 2.0\\ 1.0\\ 2.0\\ 1.0\\ 3.0\\ 2.0\\ 1.0\\ 2.0\\ 1.0\\ 2.0\\ 1.0\\ 3.0\\ 2.0\\ 3.0\\ 2.0\\ 3.0\\ 2.0\\ 2.0\\ 2.0\\ 2.0\\ 2.0\\ 2.0\\ 1.0\\ 5.0\\ 1.0\\ 1.0\\ 1.0\\ 1.0\\ 1.0\\ 1.0\\ 1.0\\ 1$	Trank
Ethylbenzene Hexachlorobutadie Isopropylbenzene Methyl tert-butyl e Methylene Chlorid m-Xylene & p-Xyle TestAmerica Sea	ther le ene	ND ND ND ND ND ND Page 1	27 of 5269		0.51 0.49 0.30 0.17 1.3 0.13	3.0 2.0 1.0 5.0 3.0	07/27/2015
		1 490 1	2. 0. 0200		^		0112010

MW 7-3015

Job Number: 580-51018-1

3.0

1.0

3.0

1.0

5.0

5.0

Acceptance Limits

70 - 120

75 - 120

85 - 115

85 - 120

70 - 136

Client: Ecology and Environment, Inc.

Analyte

Trichloroethene

Vinyl chloride

Surrogate

Diisopropyl ether

Ethyl t-butyl ether

Toluene-d8 (Surr)

Trifluorotoluene (Surr)

Trichlorofluoromethane

Tert-amyl methyl ether

1.2-Dichloroethane-d4 (Surr)

4-Bromofluorobenzene (Surr)

Dibromofluoromethane (Surr)

#### **Client Sample ID:** 15244117 Lab Sample ID: 580-51018-2 Date Sampled: 06/17/2015 1510 **Client Matrix:** Date Received: 06/20/2015 1045 Water 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-193774 Instrument ID: TAC003 MS222580.D Prep Method: 5030B Prep Batch: Lab File ID: N/A Dilution: Initial Weight/Volume: 1.0 10 mL Analysis Date: 07/01/2015 2241 Final Weight/Volume: 10 mL Prep Date: 07/01/2015 2241 Result (ug/L) Qualifier MDL RL Naphthalene 0.26 2.0 n-Butylbenzene 0.63 3.0 N-Propylbenzene 0.57 3.0 o-Xylene 0.49 2.0 NÞ sec-Butylbenzene Nþ 0.53 3.0 Styrene NÞ 0.62 5.0 Nþ t-Butylbenzene 0.53 3.0 Nþ Toluene 0.44 2.0 trans-1,2-Dichloroethene 0.24 1.0 trans-1,3-Dichloropropene 0.16 1.0

0.51

0.12

0.63

0.22

0.34

0.29

Qualifier

Nþ

NÞ

Nb

NЬ

ND

ND

42~

%Rec

101

101

100

103

100

Test/	Ameri	ca S	eatt	e
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MW 7.

Client: Ecology and Environment, Inc.

Client Sample ID:	15244117				
Lab Sample ID: Client Matrix:	580-51018-2 Water				npled: 06/17/2015 1510 ceived: 06/20/2015 1045
	٤	3260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/01/2015 2241 07/01/2015 2241	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222580.D 10 mL 10 mL
Tentatively Identi	fied Compounds	Number TIC's F	ound: 0		
Cas Number	Analyte Tentatively Identified	Compound		Est. Result (ug/ None	L) Qualifier

07/27/2015

Mu 7-30-15

Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

**Client Sample ID:** 15244117 Lab Sample ID: 580-51018-2 Date Sampled: 06/17/2015 1510 Client Matrix: Water Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-194263 Instrument ID: TAC036 Prep Method: 5030B Prep Batch: N/A Lab File ID: hp359512.D Dilution: 1.0 Initial Weight/Volume: 5 mL Analysis Date: 07/08/2015 2159 Final Weight/Volume: 5 mL Prep Date: 07/08/2015 2159 Analyte Result (ug/L) Qualifier MDL RL Tetrachloroethene NOMU 0.75 3.0 Ani

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	99	n na haran na na mangang kang kang kang kang kang kang kan	70 - 120
4-Bromofluorobenzene (Surr)	106		75 - 120
Dibromofluoromethane (Surr)	105		85 - 115
Toluene-d8 (Surr)	100		85 - 120
Trifluorotoluene (Surr)	94		70 - 136

**TestAmerica Seattle** 

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MW 7-30

Client: Ecology and Environment, Inc.

Client Sample ID:	15244118								
Lab Sample ID:	580-51018-3				Date Sar	mpled: 06/17/2015 1600			
Client Matrix:	Water				Date Re	ceived: 06/20/2015 1045			
8260C Volatile Organic Compounds by GC/MS									
Analysis Method:	8260C	Analysis Batch:	580-193774		Instrument ID:	TAC003			
Prep Method:	5030B	Prep Batch:	N/A		Lab File ID:	MS222581.D			
Dilution:	1.0				Initial Weight/Volume:	10 mL			
Analysis Date:	07/01/2015 2308				Final Weight/Volume:	10 mL			
Prep Date:	07/01/2015 2308								
Analyte		Result (u	ig/L) (	Qualifie	r MDL	RL			
1,1,1,2-Tetrachloroethane		ŊD		. 12.012, 120-1965, 1989	0.48	2.0			
1,1,1-Trichloroethane		ND	1		0.58	3.0			
1,1,2,2-Tetrachloroethane		ND	1	Ī	0.24	1.0			
1,1,2-Trichloroetha		ND		1	0.24	1.0			
1,1-Dichloroethane		ND			0.44	2.0			
1,1-Dichloroethene		ND		1	0.33	2.0			
1,1-Dichloroproper		ND	1	1	0.50	3.0			
1,2,3-Trichlorobenzene 1,2,3-Trichloropropane					0.32 0.41	2.0			
1,2,4-Trichloroben					0.23	2.0			
1,2,4-Trimethylber		ND			0.50	3.0			
1,2-Dibromo-3-Chloropropane		ND			0.40	2.0			
1,2-Dibromoethan		ND		l	0.15	1.0			
1,2-Dichlorobenzene		ND	*	*	0.35	2.0			
1,2-Dichloroethane		ND		(	0.16	1.0			
1,2-Dichloropropa	ne	ND			0.18	1.0			
1,3,5-Trimethylber	nzene	ND			0.50	3.0			
1,3-Dichlorobenzene		ND			0.44	2.0			
1,3-Dichloropropane		ND			0.15	1.0			
1,4-Dichlorobenzene		ΝD		1	0.39	2.0			
2,2-Dichloropropane		ND	*	1	0.68	3.0			
2-Chlorotoluene		ND	1	1	0.52	3.0			
4-Chlorotoluene		ND			0.46	2.0			
4-Isopropyltoluene		ND ND			0.53 0.42	3.0			
Benzene Bromobenzene		ND			0.42	2.0 2.0			
Bromochloromethane		ND			0.29	2.0			
Bromodichloromethane		ND	-	4	0.30	2.0			
Bromoform		ND		1	0.21	1.0			
Bromomethane		ND			0.27	5.0			
Carbon tetrachloride		ND	*	1	0.55	3.0			
Chlorobenzene	Chlorobenzene		1		0.42	2.0 V O			
Chloroethane		ND		1	0.40	5.0 TANK			
Chloroform		ND		1	0.17	1.0			
Chloromethane		ND			0.64	5.0			
cis-1,2-Dichloroeth		ND		.)	0.21	1.0			
cis-1,3-Dichloropropene		ND	Ň	ju /	0.20	1.0			
Dibromochloromethane					0.20	1.0			
Dibromomethane Dichlorodifluoromethane					0.14 0.31	1.0			
Ethylbenzene					0.51	2.0 3.0			
Hexachlorobutadiene		ND			0.49	2.0			
Isopropylbenzene		ND			0.30	2.0			
Methyl tert-butyl ether		ND			0.17	1.0			
Methylene Chlorid		NБ			1.3	5.0			
m-Xylene & p-Xyle		.ND Www			0.13	3.0			
TestAmerica Sea	ttle		31 of 5269			07/27/2015			

MW 7-30-15

Client: Ecology and Environment, Inc.

## Job Number: 580-51018-1

Client Sample ID	: 15244118								
Lab Sample ID: Client Matrix:	580-51018-3 Water				mpled: 06/17/2015 1600 ceived: 06/20/2015 1045				
8260C Volatile Organic Compounds by GC/MS									
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/01/2015 2308 07/01/2015 2308	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222581.D 10 mL 10 mL				
Analyte Naphthalene n-Butylbenzene N-Propylbenzene o-Xylene sec-Butylbenzene Styrene t-Butylbenzene Toluene trans-1,2-Dichloro trans-1,3-Dichloro Trichloroethene Diisopropyl ether Trichlorofluoromet Vinyl chloride Ethyl t-butyl ether Tert-amyl methyl e	ethene propene thane	Result (u ND ND ND ND ND ND ND ND ND ND ND ND ND	g/L) Qu	alifier MDL 0.26 0.63 0.57 0.49 0.53 0.62 0.53 0.44 0.24 0.16 0.51 0.12 0.63 0.22 0.34 0.29	RL 2.0 3.0 3.0 2.0 3.0 5.0 3.0 2.0 1.0 1.0 3.0 1.0 3.0 1.0 5.0 5.0				
Surrogate 1,2-Dichloroethan 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 101 102 101 102 100	Qu	alifier Accepta 70 - 120 75 - 120 85 - 115 85 - 120 70 - 136					

**TestAmerica Seattle** 

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MW73015

Client: Ecology and Environment, Inc.

#### Job Number: 580-51018-1

Client Sample ID	: 15244118				
Lab Sample ID: Client Matrix:	580-51018-3 Water				npled: 06/17/2015 1600 ceived: 06/20/2015 1045
	8	260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/01/2015 2308 07/01/2015 2308	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222581.D 10 mL 10 mL
Tentatively Ident	ified Compounds	Number TIC's F	ound: 0		
Cas Number	Analyte		RT	Est. Result (ug	/L) Qualifier
a Detro, den de Carlon de Antoine de Antoine de Antoine de Antoine de Antoine Detro, de la Carlon de Antoine de	Tentatively Identified (	Compound		None	ан 1 тор насто и сболиком 1 алемар тария в делек и макси жене и такото с такото и так

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MW7-30-15

Job Number: 580-51018-1

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#### Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244118 Lab Sample ID: 580-51018-3 Date Sampled: 06/17/2015 1600 **Client Matrix:** Water Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-194263 Instrument ID: TAC036 Prep Method: 5030B Prep Batch: N/A Lab File ID: hp359513.D Dilution: 1.0 Initial Weight/Volume: 5 mL Analysis Date: 07/08/2015 2226 Final Weight/Volume: 5 mL Prep Date: 07/08/2015 2226 Analyte Result (ug/L) Qualifier MDL RL Tetrachloroethene MALIN 0.75 3.0 Ann Surrogate %Rec Qualifier Acceptance Limits 70 - 120 1,2-Dichloroethane-d4 (Surr) 97 4-Bromofluorobenzene (Surr) 87 75 - 120 Dibromofluoromethane (Surr) 111 85 - 115 Toluene-d8 (Surr) 101 85 - 120

95

**TestAmerica Seattle** 

Trifluorotoluene (Surr)

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07/27/2015

MW 7-30

Client: Ecology and Environment, Inc.

Client Sample ID:	15244119				
Lab Sample ID: Client Matrix:	580-51018-4 Water				mpled: 06/17/2015 1515 ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds	by GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/01/2015 2335 07/01/2015 2335	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222582.D 10 mL 10 mL
Analyte		Result (u	ig/L) Q	Qualifier MDL	RL , /
1,1,1,2-Tetrachlore				0.48	2.0
1,1,1-Trichloroetha		ND	1	0.58	3.0
1,1,2,2-Tetrachlore		ND	1	0.24	1.0
1,1,2-Trichloroetha		ND	1	0.24	1.0
1,1-Dichloroethane		ŅD	1	0.44	2.0
1,1-Dichloroethen		ND	1	0.33	2.0
1,1-Dichloroproper		ND ND	1	0.50	3.0
1,2,3-Trichloroben 1,2,3-Trichloroprop		ND ND		0.32 0.41	2.0 2.0
1,2,4-Trichloroben		ND		0.23	1.0
1,2,4-Trimethylber		ND	1	0.50	3.0
1,2-Dibromo-3-Ch		ND		0.40	2.0
1,2-Dibromoethan		ND		0.15	1.0
1,2-Dichlorobenze		ND	*	0.35	2.0
1,2-Dichloroethane		ND	1	0.16	1.0
1,2-Dichloropropa	ne	ND	1	0.18	1.0
1,3,5-Trimethylber	nzene	ŊD	1	0.50	3.0
1,3-Dichlorobenze	ne	ND	(	0.44	2.0
1,3-Dichloropropa		ΝD		0.15	1.0
1,4-Dichlorobenze		ND		0.39	2.0
2,2-Dichloropropa	ne	ND	1	0.68	3.0
2-Chlorotoluene		ND	1	0.52	3.0
4-Chlorotoluene		ND	1	0.46	2.0
4-Isopropyltoluene	)	NP		0.53	3.0
Benzene Bromobenzene		ND	L.	0.42 0.42	2.0
Bromochlorometha	200			0.42	2.0
Bromodichloromet		ND	*	0.30	2.0
Bromoform	linano	ND	1	0.21	1.0
Bromomethane		ND		0.27	5.0
Carbon tetrachlori	de	NĎ	*	0.55	3.0
Chlorobenzene		ND	ŀ	0.42	2.0
Chloroethane				0.40	
Chloroform		ND	1	0.17	1.0
Chloromethane		ND		0.64	5.0
cis-1,2-Dichloroeth		ND	}	0.21	1.0
cis-1,3-Dichloropro		ND	shi	₩ 0.20 0.20	1.0
Dibromochlorome	thane	ND	00		1.0
Dibromomethane Dichlorodifluorome	athana	ND		0.14	1.0
	eulane			0.31	2.0
Ethylbenzene Hexachlorobutadie	ana			0.51 0.49	3.0 2.0
Isopropylbenzene		ND		0.49	2.0
Methyl tert-butyl e		ND		0.30	1.0
Methylene Chlorid		ND		1.3	5.0
m-Xylene & p-Xyle		ND /		0.13	3.0
		Ĩw		0.10	0,0 1
TestAmerica Sea	ttle	Page 1	35 of 5269		07/27/2015
		0		0	

07/27/2015 Mu 7-3015

Client: Ecology and Environment, Inc.

#### Job Number: 580-51018-1

Client Sample ID Lab Sample ID: Client Matrix:	: <b>15244119</b> 580-51018-4 Water					npled: 06/17/2015 1515 ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compound	s by G	C/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/01/2015 2335 07/01/2015 2335	Analysis Batch: Prep Batch:	580-193774 N/A		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222582.D 10 mL 10 mL
Analyte Naphthalene n-Butylbenzene N-Propylbenzene o-Xylene sec-Butylbenzene Styrene t-Butylbenzene Toluene trans-1,2-Dichloro trans-1,3-Dichloro Trichloroethene Diisopropyl ether Trichlorofluoromet Vinyl chloride Ethyl t-butyl ether Tert-amyl methyl o	ethene propene thane	Result (u ND ND ND ND ND ND ND ND ND ND ND ND ND	g/L)	Qualific	MDL           0.26           0.63           0.57           0.49           0.53           0.62           0.53           0.44           0.24           0.16           0.51           0.12           0.63           0.22           0.34           0.29	RL 2.0 3.0 3.0 2.0 3.0 5.0 3.0 2.0 1.0 1.0 3.0 1.0 3.0 1.0 3.0 1.0 5.0 5.0
Surrogate 1,2-Dichloroethan 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 100 100 100 102 101		Qualifie	er Acceptar 70 - 120 75 - 120 85 - 115 85 - 120 70 - 136	

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07/27/2015

Mw 7-30-15

Client: Ecology and Environment, Inc.

Client Sample ID	: 15244119				
Lab Sample ID: Client Matrix:	580-51018-4 Water				npled: 06/17/2015 1515 ceived: 06/20/2015 1045
	٤	8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/01/2015 2335 07/01/2015 2335	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222582.D 10 mL 10 mL
Tentatively Ident	ified Compounds	Number TIC's F	ound: 0		
Cas Number	Analyte		RT	Est. Result (ug	/L) Qualifier
a talajit tanat ka ina a talan di kata dan kanada dan kata da	Tentatively Identified	Compound	nan dara dar 19 kanan ta seletur seletur seletur dar yek anal an b	None	ndi bahara sa itu disela na ngi kana ngi na ngi kana ngi na ngi na ngi na ngi na ngi na ngi ngi ngi ngi ngi ng

07/27/2015

UNW 7=30-15

Job Number: 580-51018-1

85 - 115

85 - 120

70 - 136

#### Client: Ecology and Environment, Inc.

Dibromofluoromethane (Surr)

Toluene-d8 (Surr)

Trifluorotoluene (Surr)

**Client Sample ID:** 15244119 Lab Sample ID: 580-51018-4 Date Sampled: 06/17/2015 1515 **Client Matrix:** Water Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-194263 Instrument ID: TAC036 Prep Method: 5030B Prep Batch: Lab File ID: hp359514.D N/A Dilution: 1.0 Initial Weight/Volume: 5 mL Analysis Date: 07/08/2015 2252 Final Weight/Volume: 5 mL Prep Date: 07/08/2015 2252 Analyte Result (ug/L) Qualifier MDL RL Tetrachloroethene Alm TOW 0.75 3.0 %Rec Qualifier Surrogate Acceptance Limits 70 - 120 1,2-Dichloroethane-d4 (Surr) 96 4-Bromofluorobenzene (Surr) 75 - 120 102

106

98

95

#### **TestAmerica Seattle**

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07/27/2015

Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

15244120

580-51018-5

**Client Sample ID:** 

Lab Sample ID:

#### Date Sampled: 06/18/2015 1230 **Client Matrix:** Water Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-193774 Instrument ID: **TAC003** Prep Method: 5030B Prep Batch: N/A Lab File ID: MS222586.D Dilution: 1.0 Initial Weight/Volume: 10 mL Analysis Date: 07/02/2015 0125 Final Weight/Volume: 10 mL Prep Date: 07/02/2015 0125 Analyte Result (ug/L) Qualifier MDL RL 1,1,1,2-Tetrachloroethane F1 \* 0.48 2.0 ND ND 1,1,1-Trichloroethane =1 \* 0.58 3.0 ND 1.1.2.2-Tetrachloroethane 1 \* 0.24 1.0 1,1,2-Trichloroethane ND 0.24 1.0 1,1-Dichloroethane D 0.44 2.0 1,1-Dichloroethene ND 0.33 2.0 ND 1,1-Dichloropropene 0.50 3.0 ND 1,2,3-Trichlorobenzene 0.32 2.0 ND 1,2,3-Trichloropropane 0.41 2.0 1,2,4-Trichlorobenzene ND 0.23 1.0 1,2,4-Trimethylbenzene ND 0.50 3.0 1 1,2-Dibromo-3-Chloropropane ND 0.40 2.0 1 1,2-Dibromoethane ΝD 0.15 1.0 ND 1,2-Dichlorobenzene 0.35 2.0 ND 1,2-Dichloroethane 0.16 1.0 ND 1,2-Dichloropropane 0.18 1.0 ND 1,3,5-Trimethylbenzene 0.50 3.0 1,3-Dichlorobenzene ND 0.44 2.0 1,3-Dichloropropane ND 0.15 1.0 1.4-Dichlorobenzene ND 0.39 2.0 2,2-Dichloropropane 1D 0.68 3.0 2-Chlorotoluene ND 0.52 3.0 4-Chlorotoluene 2.0 D 0.46 4-Isopropyltoluene ND 0.53 3.0 Benzene 2.0 0.42 Nn 2.0 Bromobenzene 0.42 Bromochloromethane 0.29 2.0 Bromodichloromethane 2.0 F 0.30 Bromoform F 0.21 1.0 Bromomethane ND 0.27 5.0 Carbon tetrachloride Nþ F 0.55 3.0 F NÞ 2.0 Chlorobenzene 0.42 0.40 Chloroethane 5.0 **4**4-Chloroform NØ F 0.17 1.0 Chloromethane ND 0.64 5.0 F cis-1.2-Dichloroethene NÞ 0.21 1.0 F cis-1,3-Dichloropropene 0.20 1.0 Dibromochloromethane F 0.20 1.0 F٢ Dibromomethane ND 0.14 1.0 Dichlorodifluoromethane NÞ 0.31 2.0 F Ethylbenzene NÞ 0.51 3.0 Hexachlorobutadiene Nb F 0.49 2.0 F Isopropylbenzene ND 0.30 2.0 NØ F Methyl tert-butyl ether 0.17 1.0 Methylene Chloride 1.3 NØ 5.0

**TestAmerica Seattle** 

m-Xylene & p-Xylene

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ND

07/27/2015

3.0

Alw 7-30-

0.13

Client: Ecology and Environment, Inc.

#### Job Number: 580-51018-1

Client Sample ID:	: 15244120				
Lab Sample ID: Client Matrix:	580-51018-5 Water				mpled: 06/18/2015 1230 aceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/02/2015 0125 07/02/2015 0125	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume Final Weight/Volume:	
Analyte		Result (u	g/L) Qua	lifier MDL	RL ,
Naphthalene	nandit (aandit) na na maarige af ann 1919 an 1919 an 191		F1	0.26	2.0
n-Butylbenzene		ND	F1	0.63	3.0
N-Propylbenzene		ND	F1	0.57	3.0
o-Xylene		ND	E1.	0.49	2.0
sec-Butylbenzene		ND	F1*	0.53	3.0
Styrene t-Butylbenzene			F1	0.62 0.53	5.0 3.0
Toluene			F1 *	0.44	2.0
trans-1,2-Dichloro	ethene	ND	· ['	0.24	1.0
trans-1,3-Dichloro		ND	F1 *		1.0
Trichloroethene	proporto	ND	F1	0.51	3.0
Diisopropyl ether		ND		0.12	1.0
Trichlorofluoromet	thane	ND		0.63	3.0
Vinyl chloride		ND	1	0.22	1.0
Ethyl t-butyl ether		ŊD	F <mark>1</mark> 1	0.34	5.0
Tert-amyl methyl e	ether	MPMU	F\	0.29	5.0
Surrogate		%Řec	Qua	lifier Accepta	ance Limits
1,2-Dichloroethan		1. Construction of the second s	energian ant failings a distants for failt and and a shorter	70 - 120	•
4-Bromofluoroben	· · ·	101		75 - 120	
Dibromofluoromet		104		85 - 115	
Toluene-d8 (Surr)		103		85 - 120	
Trifluorotoluene (S	Surr)	97		70 - 136	5

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MW 7-30-15

Client: Ecology and Environment, Inc.

Client Sample ID:	15244120				
Lab Sample ID: Client Matrix:	580-51018-5 Water				npled: 06/18/2015 1230 ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/02/2015 0125 07/02/2015 0125	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222586.D 10 mL 10 mL
Tentatively Identi	fied Compounds	Number TIC's F	ound: 0		
Cas Number	Analyte		RT	Est. Result (ug	L) Qualifier
a normalization advisor de 1964 de constituir e la constituir de la	Tentatively Identifie	ed Compound	n ver maar na gesterlike state state state state en state een state een state een state een state een state een	None	unde die seelingen soferen statistik waarde seelingen ook waarde soferen.

07/27/2015

Client: Ecology and Environment, Inc.

Client Sample ID:	15244120						
Lab Sample ID: Client Matrix:	580-51018-5 Water						npled: 06/18/2015 1230 evived: 06/20/2015 1045
		8260C Volatile Organi	ic Compoun	ds by G	C/MS		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/08/2015 2318 07/08/2015 2318	Analysis Batch: Prep Batch:	580-19426 N/A	3	Instrument Lab File ID Initial Weig Final Weigl	: ht/Volume:	TAC036 hp359515.D 5 mL 5 mL
Analyte		Result (u	ıg/L)	Qualifi	er M	DL	RL
Tetrachloroethene	alaanaa yoo ahaanaa ahaanaa ka dhaaraa ahaa ahaa ahaa ahaalaan ahaa ahaa aha	APpoin		-++-F-10	va 0.	75	3.0 VJ
Surrogate		%Rec		Qualifie	ər	Acceptan	ce Limits
1,2-Dichloroethane 4-Bromofluoroben		75 107				70 - 120 75 - 120	
Dibromofluoromet		91				85 - 115	
Toluene-d8 (Surr)		101				85 - 120	
Trifluorotoluene (S	Surr)	105				70 - 136	

07/27/2015 MW 7-30-15

#### Client: Ecology and Environment, Inc.

4-Chlorotoluene

Bromobenzene

Bromomethane

Chloroethane Chloroform Chloromethane cis-1,2-Dichloroethene cis-1,3-Dichloropropene Dibromochloromethane Dibromomethane Dichlorodifluoromethane

Ethylbenzene Hexachlorobutadiene Isopropylbenzene Methyl tert-butyl ether Methylene Chloride m-Xylene & p-Xylene

**TestAmerica Seattle** 

Benzene

Bromoform

4-Isopropyltoluene

Bromochloromethane

Carbon tetrachloride Chlorobenzene

Bromodichloromethane

# Job Number: 580-51018-1

**Client Sample ID:** 15244121 Lab Sample ID: 580-51018-6 Date Sampled: 06/17/2015 1440 **Client Matrix:** Water Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-193774 Instrument ID: **TAC003** Prep Method: 5030B Prep Batch: Lab File ID: MS222583.D N/A Dilution: 1.0 Initial Weight/Volume: 10 mL Analysis Date: 07/02/2015 0003 Final Weight/Volume: 10 mL Prep Date: 07/02/2015 0003 Analyte Result (ug/L) Qualifier MDL RL 1,1,1,2-Tetrachloroethane ND 0.48 2.0 ND 1,1,1-Trichloroethane lΗ 0.58 3.0 ND 1,1,2,2-Tetrachloroethane Iн 0.24 1.0 1,1,2-Trichloroethane ND 0.24 1.0 1,1-Dichloroethane ND 0.44 2.0 1,1-Dichloroethene ND 0.33 2.0 ND 1,1-Dichloropropene 0.50 3.0 1,2,3-Trichlorobenzene ND 0.32 2.0 1,2,3-Trichloropropane ND 0.41 2.0 1,2,4-Trichlorobenzene ND 0.23 1.0 1,2,4-Trimethylbenzene ND 0.50 3.0 1,2-Dibromo-3-Chloropropane ND 0.40 2.0 1.2-Dibromoethane ND 0.15 1.0 1,2-Dichlorobenzene ΝD 0.35 2.0 ND 1.2-Dichloroethane 0.16 1.0 1.2-Dichloropropane ND 0.18 1.0 1,3,5-Trimethylbenzene ND 0.50 3.0 ND 1,3-Dichlorobenzene 0.44 2.0 ND 1,3-Dichloropropane 0.15 1.0 ND 1,4-Dichlorobenzene 0.39 2.0 2,2-Dichloropropane ND 0.68 3.0 2-Chlorotoluene ND 0.52 3.0

ND

ND

ND

ND

ND

ND

ND

ND ł	-	0.27	5.0
ND *	H	0.55	3.0
ND H ND * ND *	H	0.42	2.0 VV
AD	-	0.40	2.0 V V MIN R 5.0 L J MIN R
ND ł	-	0.17	1.0 00
ND H	-1	0.64	5.0
ND H		0.21	1.0
ND *		0.20	1.0
ND H		0.20	1.0
	-1	0.14	1.0
		0.31	2.0
		0.51	3.0
мр н		0.49	2.0
ND I		0.30	2.0
ND I		0.17	1.0
ND I	H	1.3	5.0
ND	H .	0.13	3.0
Are I	Ĩ		• •
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		Mu	7-3015
		V	

0.46

0.53

0.42

0.42

0.29

0.30

0.21

2.0

3.0

2.0

2.0

2.0

2.0

1.0

#### Client: Ecology and Environment, Inc.

Lab Sample ID: Client Matrix:	580-51018-6 Water				mpled: 06/17/2015 14 ceived: 06/20/2015 10
	8	260C Volatile Organi	c Compounds by (	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/02/2015 0003 07/02/2015 0003	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222583.D 10 mL 10 mL
Analyte Naphthalene n-Butylbenzene N-Propylbenzene o-Xylene sec-Butylbenzene Styrene t-Butylbenzene Toluene trans-1,2-Dichloro trans-1,3-Dichloro Trichloroethene Diisopropyl ether Trichlorofluoromet Vinyl chloride Ethyl t-butyl ether Tert-amyl methyl ether	propene hane	Result (u ND ND ND ND ND ND ND ND ND ND ND ND ND	g/L) Qualif H H H H H H H H H H H H H H H H H H H	ier MDL 0.26 0.63 0.57 0.49 0.53 0.62 0.53 0.44 0.24 0.16 0.51 0.12 0.63 0.22 0.34 0.29	RL 2.0 3.0 3.0 2.0 3.0 5.0 3.0 2.0 1.0 1.0 3.0 1.0 3.0 1.0 5.0 5.0 3.0 1.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5
Surrogate 1,2-Dichloroethan 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 104 100 101 101 100	Qualif	ier Accepta 70 - 120 75 - 120 85 - 115 85 - 120 70 - 136	

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Client: Ecology and Environment, Inc.

Client Sample ID:	: 15244121				
Lab Sample ID: Client Matrix:	580-51018-6 Water				npled: 06/17/2015 1440 ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/02/2015 0003 07/02/2015 0003	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222583.D 10 mL 10 mL
Tentatively Ident	ified Compounds	Number TIC's F	ound: 0		
Cas Number	Analyte		RT	Est. Result (ug	/L) Qualifier
n meneral services and an an and a first service and a first service of the servi	Tentatively Identifie	d Compound		None	Apr

07/27/2015 Mw 7-30-15

Job Number: 580-51018-1

#### Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244121 Lab Sample ID: 580-51018-6 Date Sampled: 06/17/2015 1440 **Client Matrix:** Water Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-194263 TAC036 Instrument ID: Prep Method: 5030B Prep Batch: N/A Lab File ID: hp359516.D Dilution: 1.0 Initial Weight/Volume: 5 mL Analysis Date: 07/08/2015 2344 Final Weight/Volume: 5 mL Prep Date: 07/08/2015 2344 Qualifier Analyte Result (ug/L) MDL HMM Tetrachloroethene NDNU 0.75 Surrogate %Rec Qualifier Acceptance Limits 1,2-Dichloroethane-d4 (Surr) 70 - 120 97 4-Bromofluorobenzene (Surr) 104 75 - 120 Dibromofluoromethane (Surr) 103 85 - 115 Toluene-d8 (Surr) 85 - 120 98 Trifluorotoluene (Surr) 94 70 - 136

**TestAmerica Seattle** 

07/27/2015 MW 7-30-15

Client: Ecology and Environment, Inc.

Client Sample ID:	: 15244122					
Lab Sample ID:	580-51018-7					npled: 06/17/2015 1535
Client Matrix:	Water				Date Rec	ceived: 06/20/2015 1045
	8	260C Volatile Organi	c Compound	ds by G	C/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/02/2015 1641 07/02/2015 1641	Analysis Batch: Prep Batch:	580-193840 N/A	)	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222609.D 10 mL 10 mL
Analyte		Result (u	g/L)	Qualifie	er MDL	RL
1,1,1,2-Tetrachlor	oethane	ND	and the second state of the second	H	0.48	2.0 UT
1,1,1-Trichloroetha		ND		Ĥ Ì	0.58	3.0 11
1,1,2,2-Tetrachlor		ND		H	0.24	1.0
1,1,2-Trichloroetha		NP		H *	0.24	1.0
1,1-Dichloroethane		NID		1	0.44 0.33	2.0
1,1-Dichloroprope				1	0.50	2.0 3.0
1,2,3-Trichloroben		ND		1	0.32	2.0
1,2,3-Trichloropro		ND		H*	0.41	2.0
1,2,4-Trichloroben		ND		Ĥ	0.23	1.0
1,2,4-Trimethylber	nzene	NP		н	0.50	3.0
1,2-Dibromo-3-Ch		NÞ		Н	0.40	2.0
1,2-Dibromoethan		ND		H*	0.15	1.0
1,2-Dichlorobenze		ND		1	0.35	2.0
1,2-Dichloropropa				1	0.16 0.18	1.0
1,3,5-Trimethylber		ND		1	0.50	3.0
1,3-Dichlorobenze		ND		HA .	0.44	2.0
1,3-Dichloropropa		ND		Ĥ∎*	0.15	1.0
1,4-Dichlorobenze		ND		н	0.39	2.0
2,2-Dichloropropa	ne	ND		Н^	0.68	3.0
2-Chlorotoluene		ND		H	0.52	3.0
4-Chlorotoluene		ND		Η	0.46	2.0
4-Isopropyltoluene Benzene	*			н) н/	0.53 0.42	3.0 2.0
Bromobenzene		ND		H	0.42	2.0
Bromochlorometha	ane	ND		H	0.29	2.0
Bromodichloromet	thane	NØ		нj	0.30	2.0
Bromoform		NØ		H)	0.21	1.0
Bromomethane		NP		۳.	0.27	5.0
Carbon tetrachlori	de	ND		₩^	0.55	3.0
Chlorobenzene Chloroethane				п н *	0.42	2.0 5.0
Chloroform		ND		H	0.17	1.0 03
Chloromethane		ND		H.	0.64	5.0
cis-1,2-Dichloroeth	hene	ND		H	0.21	1.0
cis-1,3-Dichloropro		ΝD		H	0.20	1.0
Dibromochloromet	thane	ND		H	0.20	1.0
Dibromomethane	- 44	ND		H I.	0.14	1.0
Dichlorodifluorome Ethylbenzene	eulane	ND ND		1 1	0.31 0.51	2.0
Hexachlorobutadie	ene			Н	0.49	3.0 2.0
Isopropylbenzene		ND		Ĥ	0.30	2.0
Methyl tert-butyl e		ND		н	0.17	1.0
Methylene Chlorid	e	NP		нĮ	1.3	5.0
m-Xylene & p-Xyle	ene	ND.		H	0.13	3.0 MM
TestAmerica Sea	ttle	Page 1	47 of 5269	m		07/27/2015

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Client: Ecology and Environment, Inc.

#### Client Sample ID: 15244122 580-51018-7 Date Sampled: 06/17/2015 1535 Client Matrix: Water Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-193840 Instrument ID: TAC003 Prep Method: 5030B Prep Batch: N/A Lab File ID: MS222609.D Dilution: 1.0 Initial Weight/Volume: 10 mL Analysis Date: 07/02/2015 1641 Final Weight/Volume: 10 mL Prep Date: 07/02/2015 1641 Analyte Result (ug/L) Qualifier MDL RL Naphthalene 0.26 2.0 ND H n-Butylbenzene 0.63 3.0 N-Propylbenzene 3.0 0.57 o-Xylene ND 0.49 2.0 sec-Butylbenzene ND 0.53 3.0 Styrene ND 0.62 5.0 t-Butylbenzene ND 0.53 3.0 Toluene 0.44 2.0 trans-1,2-Dichloroethene 0.24 1.0 N trans-1,3-Dichloropropene 0.16 N 1.0 Ľ Trichloroethene NГ 0.51 3.0

Themene	NLI	i i i i i i i i i i i i i i i i i i i	0.01	3.0 /
Diisopropyl ether	ND	H	0.12	1.0
Trichlorofluoromethane	ND	ĥ+*	0.63	3.0
Vinyl chloride	ND	ĥ	0.22	1.0
Ethyl t-butyl ether	ND	Ą	0.34	5.0
Tert-amyl methyl ether	ND	H.	0.29	5.0
	No	an l		* *
Surrogate	%Rec	Qualifier	Accepta	ance Limits
Surrogate 1,2-Dichloroethane-d4 (Surr)	%Rec 97	Qualifier	Accepta 70 - 12	annear the first sector of the state of the sector of the
0	A COMPANY AND A DESCRIPTION OF A DESCRIP	Qualifier	And the second se	na sente de la construction de la construct
1,2-Dichloroethane-d4 (Surr)	97	Qualifier	70 - 12	0 Definition of the second sec
1,2-Dichloroethane-d4 (Surr) 4-Bromofluorobenzene (Surr)	97 100	Qualifier	70 - 12 75 - 12	0 0 5
1,2-Dichloroethane-d4 (Surr) 4-Bromofluorobenzene (Surr) Dibromofluoromethane (Surr)	97 100 99	Qualifier	70 - 120 75 - 120 85 - 110	0 0 5 0

Lab Sample ID:

Job Number: 580-51018-1

07/27/2015

Mu 7-

Client: Ecology and Environment, Inc.

Client Sample ID:	15244122				
Lab Sample ID: Client Matrix:	580-51018-7 Water				npled: 06/17/2015 1535 ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/02/2015 1641 07/02/2015 1641	Analysis Batch: Prep Batch:	580-193840 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222609.D 10 mL 10 mL
Tentatively Identi	ified Compounds	Number TIC's F	ound: 1		
Cas Number	Analyte		RT	Est. Result (ug	/L) Qualifier
1066-40-6	Silanol, trimethyl-	ale na baran da ana ang ang ang ang ang ang ang ang an	7.60	norden de milier de milier de la construction de la constructio en construction de la co	THAN NO

07/27/2015 MW 73015

Client: Ecology and Environment, Inc.

Client Sample ID:	15244122					
Lab Sample ID: Client Matrix:	580-51018-7 Water					ampled: 06/17/2015 1535 eceived: 06/20/2015 1045
		8260C Volatile Organi	c Compoun	ds by G	C/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/09/2015 0010 07/09/2015 0010	Analysis Batch: Prep Batch:	580-19426 N/A	3	Instrument ID: Lab File ID: Initial Weight/Volume Final Weight/Volume	
Analyte		Result (u	g/L)	Qualifie	r MDL	RL .
Tetrachloroethene	ի որուհարդեց արձի ությունը ու ու որու արձայ ում առումները հեմ հետու է հունք հետ է հունք հետ 20 ունք հետ 20 ունք հ	Alper	an dan dipangkan pangan ang kapang ang k	AW	0.75	3.0 VF
Surrogate 1,2-Dichloroethane 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 94 105 94 112 90	a flandfal de anter anter a fland a ser a fland	Qualifie	er Accept 70 - 12 75 - 12 85 - 11 85 - 12 70 - 13	0 5 0

07/27/2015

MW 7-30-15

Job Number: 580-51018-1

#### Client: Ecology and Environment, Inc.

Client Sample ID	: 15244123				
Lab Sample ID:	580-51018-8				mpled: 06/17/2015 1400
Client Matrix:	Water				ceived: 06/20/2015 1045
		8260C Volatile Organ		GC/MS	
Analysis Method:	8260C 5030B	Analysis Batch:	580-193774 N/A	Instrument ID: Lab File ID:	TAC003 MS222584.D
Prep Method: Dilution:		Prep Batch:	N/A		
	1.0			Initial Weight/Volume:	10 mL
Analysis Date:	07/02/2015 0030			Final Weight/Volume:	10 mL
Prep Date:	07/02/2015 0030				
Analyte		Result (u	ug/L) Qualit	fier MDL	RL
1,1,1,2-Tetrachlor	oethane	ND	1H	0.48	2.0
1,1,1-Trichloroetha	ane	ND	1 H	0.58	3.0 4 4
1,1,2,2-Tetrachlor	oethane	ND	H	0.24	1.0
1,1,2-Trichloroetha	ane	NØ	ĥ	0.24	1.0
1,1-Dichloroethan	e	ND	h	0.44	2.0
1,1-Dichloroethen	е	ND	Ĥ	0.33	2.0
1,1-Dichloroprope		ND	*Н	0.50	3.0
1,2,3-Trichlorober		ND	H	0.32	2.0
1,2,3-Trichloropro		ND	ų.	0.41	2.0
1,2,4-Trichloroben	izene	NP	H)	0.23	1.0
1,2,4-Trimethylber		NÞ	H	0.50	3.0
1,2-Dibromo-3-Ch		NØ	Н	0.40	2.0
1,2-Dibromoethan		NØ	H	0.15	1.0
1,2-Dichlorobenze		NØ	∦H	0.35	2.0
1,2-Dichloroethan		NØ	H	0.16	1.0
1,2-Dichloropropa		NIÞ	H	0.18	1.0
1,3,5-Trimethylber		NØ	H	0.50	3.0
1,3-Dichlorobenze		NØ	Н	0.44	2.0
1,3-Dichloropropa		NØ	н	0.15	1.0
1,4-Dichlorobenze		NØ	H.	0.39	2.0
2,2-Dichloropropa	ne	NÞ	H *	0.68	3.0
2-Chlorotoluene		ND	1H	0.52	3.0
4-Chlorotoluene	_	NP	T.	0.46	2.0
4-Isopropyltoluene	Э	ND	T.	0.53	3.0
Benzene Bromobenzene		ND	m	0.42	2.0
	ano	ND ND	1.4	0.42	2.0
Bromochlorometh Bromodichlorome		ND	Гн	0.29 0.30	2.0
Bromoform	liane	ND	н	0.30	1.0
Bromomethane				0.27	5.0
Carbon tetrachlori	ide	ND	* H	0.55	3.0
Chlorobenzene		ND	* H	0.42	2.0
Chloroethane		ND		0.40	50 Frank
Chloroform		ND	Н	0.17	1.0
Chloromethane		ND	н	0.64	5.0
cis-1,2-Dichloroet	hene	ND	Н	0.21	1.0
cis-1,3-Dichloropr		ND	* H	0.20	1.0
Dibromochlorome		ND	н	0.20	1.0
Dibromomethane		ND	н	0.14	1.0
Dichlorodifluorom	ethane	ND	Н	0.31	2.0
Ethylbenzene		ND	H	0.51	3.0
Hexachlorobutadi	ene	ND	H	0.49	2.0
Isopropylbenzene		ND	H	0.30	2.0
Methyl tert-butyl e		ND	н	0.17	1.0
Methylene Chlorid		ND	H	1.3	5.0
m-Xylene & p-Xyle		ND	H	0.13	3.0
,		ww	when		<sup>1</sup>
TestAmerica Sea	attle		51 of 5269		07/27/2015
		5			

MW 7-3015

#### Client: Ecology and Environment, Inc.

Client Sample ID Lab Sample ID: Client Matrix:	: <b>15244123</b> 580-51018-8 Water				mpled: 06/17/2015 1400 ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/02/2015 0030 07/02/2015 0030	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222584.D 10 mL 10 mL
Analyte Naphthalene n-Butylbenzene N-Propylbenzene o-Xylene sec-Butylbenzene Styrene t-Butylbenzene Toluene trans-1,2-Dichloro trans-1,3-Dichloro Trichloroethene Diisopropyl ether Trichlorofluoromet Vinyl chloride Ethyl t-butyl ether Tert-amyl methyl ether	ethene propene hane	Result (u ND ND ND ND ND ND ND ND ND ND ND ND ND	g/L) Quali H H H H H H H H H H H H H H H H H H H	ifier MDL 0.26 0.63 0.57 0.49 0.53 0.62 0.53 0.44 0.24 0.16 0.51 0.12 0.63 0.22 0.34 0.29	RL 2.0 3.0 3.0 2.0 3.0 5.0 3.0 2.0 1.0 1.0 1.0 3.0 1.0 3.0 1.0 5.0 3.0 1.0 5.0 3.0 1.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5
Surrogate 1,2-Dichloroethan 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 107 100 103 95 100	Qual	ifier Accepta 70 - 120 75 - 120 85 - 115 85 - 120 70 - 136	

07/27/2015 Mw 7-30-15

Client: Ecology and Environment, Inc.

Client Sample ID	: 15244123				
Lab Sample ID: Client Matrix:	580-51018-8 Water				npled: 06/17/2015 1400 ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/02/2015 0030 07/02/2015 0030	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222584.D 10 mL 10 mL
Tentatively Ident	ified Compounds	Number TIC's F	ound: 0		
Cas Number	Analyte		RT	Est. Result (ug	/L) Qualifier
<ul> <li>- max strends is factor of stability (\$5, \$2,50 million) and \$5,00 million</li> </ul>	Tentatively Identified	d Compound	anan watan Thermit Anthropologian Mahmut Kandestan	None	Fim

07/27/2015 MW7=30-15

Client: Ecology and Environment, Inc.

Client Sample ID:	15244123					
Lab Sample ID: Client Matrix:	580-51018-8 Water					mpled: 06/17/2015 1400 ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compound	s by G	C/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/09/2015 0036 07/09/2015 0036	Analysis Batch: Prep Batch:	580-194263 N/A		Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC036 hp359518.D 5 mL 5 mL
Analyte		Result (u	g/L)	Qualifie	er MDL	RL
Tetrachloroethene	ann fa shennan ku wana ku wa ku ku na mana ku ku ku mana ku ku mana ku	ABTA	an an 1979 an 2019 an 2019 an 2019 an 2019 an 2019 an 2019 An 2019 an 2019 an 2019 an 2019 an 2019 an 2019 an 2019	HAN	0.75	3.0 UJ
Surrogate		%Rec		Qualifie	er Accepta	nce Limits
1,2-Dichloroethane	· /	108	and dealer with the second	an far a that an	70 - 120	
4-Bromofluoroben: Dibromofluoromet		101 118		х	75 - 120 85 - 115	
Toluene-d8 (Surr)	· · ·	99		^	85 - 120	
Trifluorotoluene (S		93			70 - 136	

07/27/2015 MW 7-30-15

Client: Ecology and Environment, Inc.

Client Sample ID:	15244124				
Lab Sample ID:	580-51018-9			Date San	npled: 06/17/2015 1410
Client Matrix:	Water			Date Rec	eived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by C	GC/MS	
Analysis Method:	8260C	Analysis Batch:	580-193774	Instrument ID:	TAC003
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	MS222585.D
Dilution:	1.0			Initial Weight/Volume:	10 mL
Analysis Date:	07/02/2015 0058			Final Weight/Volume:	10 mL
Prep Date:	07/02/2015 0058				
Analyte		Result (u	g/L) Qualifi	ier MDL	RL
1,1,1,2-Tetrachlor		ND	*јн	0.48	2.0
1,1,1-Trichloroetha		ND	*H	0.58	3.0
1,1,2,2-Tetrachlor		ND	1.H	0.24	1.0
1,1,2-Trichloroetha		ND	С	0.24 0.44	1.0
1,1-Dichloroethene		ND ND	С	0.44	2.0
1,1-Dichloroprope			Гн	0.50	3.0
1,2,3-Trichloroben		ND		0.32	2.0
1,2,3-Trichloroprop		ND	li li	0.41	2.0
1,2,4-Trichloroben		ND	ĥ	0.23	1.0
1,2,4-Trimethylber	nzene	ND	н	0.50	3.0
1,2-Dibromo-3-Chi		NØ	h	0.40	2.0
1,2-Dibromoethan		NØ	Ĥ	0.15	1.0
1,2-Dichlorobenze		ND	*[H	0.35	2.0
1,2-Dichloroethan		ND	<u>1</u>	0.16	1.0
1,2-Dichloropropa 1,3,5-Trimethylber			1	0.18 0.50	1.0 3.0
1,3-Dichlorobenze			H	0.44	2.0
1,3-Dichloropropa		ND	Н	0.15	1.0
1,4-Dichlorobenze		ND	н	0.39	2.0
2,2-Dichloropropa		ND	H*	0.68	3.0
2-Chlorotoluene		ND	* 🛉	0.52	3.0
4-Chlorotoluene		ND	н	0.46	2.0
4-Isopropyltoluene	•	NÞ	н	0.53	3.0
Benzene		ND	H	0.42	2.0
Bromobenzene		ND	۲.	0.42	2.0
Bromochlorometha Bromodichloromet		ND	H *U	0.29 0.30	2.0 2.0
Bromoform	liane		цП	0.30	1.0
Bromomethane		ND	Ĥ	0.27	5.0
Carbon tetrachlori	de	ND	*н	0.55	3.0
Chlorobenzene		ND	*H	0.42	2.0 V V
Chloroethane		+D		0.40	5.0 - HW R
Chloroform		ND	Н	0.17	1.0 V J
Chloromethane		ND	H	0.64	5.0
cis-1,2-Dichloroeth		ND	H	0.21	1.0
cis-1,3-Dichloropro Dibromochloromet			<u>а</u> н Ц	0.20	1.0
Dibromomethane	linane		1	0.20 0.14	1.0 1.0
Dichlorodifluorome	ethane		L.	0.31	2.0
Ethylbenzene		ND	H	0.51	3.0
Hexachlorobutadie	ene	ND	H	0.49	2.0
Isopropylbenzene		ND	H	0.30	2.0
Methyl tert-butyl e		ND	H	0.17	1.0
Methylene Chlorid		ND	H	1.3	5.0
m-Xylene & p-Xyle	ene	NP	H	0.13	3.0 VV
TestAmerica Sea	#lo	Page 1	55 of 5269	)	07/27/2015
resummente sea	LUC .	raye i	00 01 0209	~	0/12/12015

MW 7-30-15

Client: Ecology and Environment, Inc.

Client Sample ID	: 15244124				
Lab Sample ID: Client Matrix:	580-51018-9 Water				mpled: 06/17/2015 1410 ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/02/2015 0058 07/02/2015 0058	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222585.D 10 mL 10 mL
Analyte Naphthalene n-Butylbenzene N-Propylbenzene o-Xylene sec-Butylbenzene Styrene t-Butylbenzene Toluene trans-1,2-Dichloro trans-1,3-Dichloro Trichloroethene Diisopropyl ether Trichlorofluoromet Vinyl chloride Ethyl t-butyl ether Tert-amyl methyl ether	ethene propene hane	Result (u ND ND ND ND ND ND ND ND ND ND ND ND ND	g/L) Quali 부 부 부 부 부 부 부 부 부 ( - - - - - - - - - - - - - - - - - -	fier MDL 0.26 0.63 0.57 0.49 0.53 0.62 0.53 0.44 0.24 0.16 0.51 0.12 0.63 0.22 0.34 0.29	RL 2.0 3.0 3.0 2.0 3.0 5.0 3.0 2.0 1.0 1.0 1.0 3.0 1.0 3.0 1.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5
Surrogate 1,2-Dichloroethan 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 111 103 103 99 98	Quali	fier Accepta 70 - 120 75 - 120 85 - 115 85 - 120 70 - 136	

07/27/2015 MWZ-30-15

Client: Ecology and Environment, Inc.

Client Sample ID	: 15244124				
Lab Sample ID: Client Matrix:	580-51018-9 Water				npled: 06/17/2015 1410 ceived: 06/20/2015 1045
	Ę	8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/02/2015 0058 07/02/2015 0058	Analysis Batch: Prep Batch:	580-193774 N/A	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC003 MS222585.D 10 mL 10 mL
Tentatively Ident	ified Compounds	Number TIC's F	ound: 0		
Cas Number	Analyte		RT	Est. Result (ug	/ / /
The second s	Tentatively Identified	Compound		None	ATAN

07/27/2015 MW 7-30-15

#### Client: Ecology and Environment, Inc.

Client Sample ID:	15244124						
Lab Sample ID: Client Matrix:	580-51018-9 Water						npled: 06/17/2015 1410 eeived: 06/20/2015 1045
	8	260C Volatile Organi	c Compou	nds by (	GC/MS		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5030B 1.0 07/09/2015 0103 07/09/2015 0103	Analysis Batch: Prep Batch:	580-19426 N/A	63	Instrument Lab File ID Initial Weig Final Weigl	: ht/Volume:	TAC036 hp359519.D 5 mL 5 mL
Analyte Tetrachloroethene	n gengene siker wag, wei noveren gener hat met weisers weisers generation. Das die serviere I	Result (u	g/L)	Qualif	process and the second state of the second system of	DL 75	RL 3.0 VJ
Surrogate 1,2-Dichloroethane 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 103 101 105 96 91	Eleven an order of the order of the	Qualif	ier	Acceptan 70 - 120 75 - 120 85 - 115 85 - 120 70 - 136	

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MW 7-30-15

## Client: Ecology and Environment, Inc.

### Job Number: 580-51018-1

Client Sample ID	: 15244101				
Lab Sample ID:	580-51018-10				mpled: 06/17/2015 0940
Client Matrix:	Solid	% Moisture	e: 26.7	Date Re	ceived: 06/20/2015 1045
	826	60C Volatile Organi	c Compounds b	y GC/MS	
Analysis Method:	8260C	Analysis Batch:	580-193607	Instrument ID:	TAC001
Prep Method:	5035	Prep Batch:	580-193241	Lab File ID:	F3015013.D
Dilution:	1.0			Initial Weight/Volume:	-
Analysis Date:	06/30/2015 1732			Final Weight/Volume:	5 mL
Prep Date:	06/25/2015 1542				
Analyte	DryWt Corrected	d: Y Result (u	g/Kg) Qua	alifier MDL	RL
1,1,1,2-Tetrachlor	oethane	ND		6.2	66
1,1,1-Trichloroeth	ane	N/D		9.2	66 1
1,1,2,2-Tetrachlor	oethane	ΝD		3.8	16
1,1,2-Trichloroeth		ND		4.6	20
1,1-Dichloroethan		NP		6.9	66
1,1-Dichloroethen		NP		8.0	33
1,1-Dichloroprope		NP		8.7	66
1,2,3-Trichlorober		NÞ		5.1	66
1,2,3-Trichloropro		NÞ		19	66
1,2,4-Trichlorober 1,2,4-Trimethylbe		NO 127	J 🖸	6.4 3.9	66 ¥ 66
1,2-Dibromo-3-Ch		ND	50	4.3	330
1,2-Dibromoethar		ND		5.6	26
1,2-Dichlorobenze		ND		20	66
1,2-Dichloroethan		ND		5.4	26
1,2-Dichloropropa		NOM-		3.9	20
1,3,5-Trimethylbe		11	зG	4.8	66
1,3-Dichlorobenze		ND	-	17	98 7
1,3-Dichloropropa	ine	ND		9.0	66 Y
1,4-Dichlorobenze		NP		18	98
2,2-Dichloropropa	ine	ND		7.9	66
2-Chlorotoluene		ND		5.6	66
4-Chlorotoluene		NP		4.9	66
4-Isopropyltoluen	e	ND		4.6	66
Benzene Bromobenzene		ND ND		5.7	26
Bromochlorometh	222			3.9 7.5	66 66
Bromodichlorome		ND		2.3	66
Bromoform		ND		11	66
Bromomethane		ND			-230 Mr. K
Carbon tetrachlor	ide	NÞ		6.2	33
Chlorobenzene		ND		16	66
Chloroethane		-140	F	26	600 Juny K
Chloroform		ND		6.9	66
Chloromethane		ND	*34v		160
cis-1,2-Dichloroet		ND		8.0	66
cis-1,3-Dichloropr		ND		3.0	26
Dibromochlorome		ND		4.6	33
Dibromomethane Dichlorodifluorom				21 11	98 66 J
Diisopropyl ether		NØ		5.7	66
Ethyl t-butyl ether		NOW~		8.5	66
Ethylbenzene		,19	JB	Q 3.3	66
Hexachlorobutadi	ene	ND	· · · · · · · · · · · · · · · · · · ·	30	130
Isopropylbenzene		ND		4.3	66
Methyl tert-butyl e		NB		9.8	66 N
		m			Y
TestAmerica Sea	attle	Page 1	59 of 5269		07/27/2015

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#### Client: Ecology and Environment, Inc.

#### Job Number: 580-51018-1

Client Sample ID:	15244101				
Lab Sample ID: Client Matrix:	580-51018-10 Solid	% Moisture:	26.7		npled: 06/17/2015 0940 evived: 06/20/2015 1045
	826	60C Volatile Organic Co	ompounds by GC	/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5035 1.0 06/30/2015 1732 06/25/2015 1542	,	0-193241 L Ir	nstrument ID: ab File ID: nitial Weight/Volume: inal Weight/Volume:	TAC001 F3015013.D 5.349 g 5 mL
Analyte Methylene Chlorid m-Xylene & p-Xyle Naphthalene n-Butylbenzene N-Propylbenzene o-Xylene sec-Butylbenzene	ene	d: Y Result (ug/Ko ₩D 75 <del>13</del> ₩ 14 9.9 46 ₩D	) Qualifier	MDL 19 4.9 5.7 5.7 4.3 4.9 4.6	RL 41 66 66 66 66 66 66 66
Styrene t-Butylbenzene Tert-amyl methyl e Tetrachloroethene Toluene trans-1,2-Dichloro trans-1,3-Dichloro	ether ethene	ND ND ND 35 8.9 ND	JBV-Q	3.9 5.1 5.9 8.7 4.3 6.2 11	66 66 33 66 66 66
Trichloroethene Trichlorofluoromet Vinyl chloride				5.1 9.7 12	39 66 26
Surrogate 1,2-Dichloroethan 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 106 101 97 103 88	Qualifier	Acceptan 71 - 136 70 - 120 75 - 132 80 - 120 65 - 140	ce Limits

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NUW7-30-15

#### Client: Ecology and Environment, Inc.

Client Sample ID	: 15244101				
Lab Sample ID: Client Matrix:	580-51018-10 Solid	% Moisture	e: 26.7		npled: 06/17/2015 0940 ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5035 1.0 06/30/2015 1732 06/25/2015 1542	Analysis Batch: Prep Batch:	580-193607 580-193241	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC001 F3015013.D 5.349 g 5 mL
Tentatively Identified Compounds		Number TIC's F	ound: 1		
Cas Number	Analyte		RT	Est. Result (ug	/Kg) Qualifier
<ul> <li>A.D. P.C. S. P. and A. M.M. M. M. M. Market and Mathematical Mathematical systems in the state of the state o</li></ul>	Unknown	en volgen in kation metalenter op in enternation after de volgen in solden in andere de solden in an enternatio	6.69	55000	IN NO

07/27/2015 MW 7-30

## Client: Ecology and Environment, Inc.

Client Sample ID	: 15244102				
Lab Sample ID:	580-51018-11			Date Sar	mpled: 06/17/2015 1017
Client Matrix:	Solid	% Moisture	e: 22.7	Date Re	ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by G	SC/MS	
Analysis Method:	8260C	Analysis Batch:	580-193607	Instrument ID:	TAC001
Prep Method:	5035	Prep Batch:	580-193241	Lab File ID:	F3015016.D
Dilution:	1.0	t top E ditein		Initial Weight/Volume:	4.227 g
Analysis Date:	06/30/2015 1904			Final Weight/Volume:	5 mL
Prep Date:	06/25/2015 1542			ġ	
Analyte	DryWt Correc	tod: V Booult /u	g/Kg) Qualifi	er MDL	DI
1,1,1,2-Tetrachlon	THE R. P. LEWIS CO., LANSING, MICH. MICH. 49 NO. 101404 (1990) INC. AND ADDRESS OF ADDRE	ted: Y Result (u		6.9	73 U
1,1,1-Trichloroetha		ND		10	73
1,1,2,2-Tetrachlor		ND		4.2	18
1,1,2-Trichloroetha		ND		5.1	22
1,1-Dichloroethan		ND		7.7	73
1,1-Dichloroethen		ND		8.9	36
1,1-Dichloroprope	ne	NQM		m) 9.7	73
1,2,3-Trichloroben		22	J BAL	L 5.6	73 ]
1,2,3-Trichloropro		-NDM-	J Pm/	21	73 <b>U</b>
1,2,4-Trichloroben		13	JC	7.1	73
1,2,4-Trimethylber		NDW	. 6.	4.4	73 <b>U</b>
1,2-Dibromo-3-Ch		16	JQ	4.7	360
1,2-Dibromoethan 1,2-Dichlorobenze		ND ND	- (	6.2 22	290
1,2-Dichloroethan		ND		6.0	73 29
1,2-Dichloropropa		ND		4.4	29
1,3,5-Trimethylber		ND		5.3	73
1,3-Dichlorobenze		ND		19	110
1,3-Dichloropropa		ND		10	73
1,4-Dichlorobenze	ene	ND		20	110
2,2-Dichloropropa	ne	ND		8.7	73
2-Chlorotoluene		мp		6.2	73
4-Chlorotoluene		NOM	0	5.5	73 🖤
4-Isopropyltoluene	e	22	JQ	5.1	73
Benzene Bromobenzene		ND ND	,	6.4	29
Bromochlorometh	ano	ND		4.4 8.4	73 73
Bromodichlorome		ND		2.6	73
Bromoform		ND		12	70 1
Bromomethane		4 <del>0</del>		-24	-200 MW R
Carbon tetrachlori	ide	ND		6.9	36
Chlorobenzene		ND	ſ	18	73
Chloroethane		ND	No. of Concession, Name of Con		
Chloroform		ND		7.7	73
Chloromethane	h	ND	t Mr	18	180
cis-1,2-Dichloroetl cis-1,3-Dichloropr			• •	8.9 3.3	73 29
Dibromochlorome		ND		5.1	36
Dibromomethane	liane	ND		24	110
Dichlorodifluorom	ethane	ND		12	73
Diisopropyl ether		ND		6.4	73
Ethyl t-butyl ether		ИЦ		9.5	73
Ethylbenzene		ND		3.6	73
Hexachlorobutadi		ND		33	150
Isopropylbenzene		ND		4.7	73 V
Methyl tert-butyl e	ther	ND		11	73 🏴
TestAmerica Sea	attle	Page 1	62 of 5269		07/27/2015
				Λ.	- 2. 1
				/ Min/	7-50-17
				0,000	

## Client: Ecology and Environment, Inc.

Client Sample ID	15244102				
Lab Sample ID: Client Matrix:	580-51018-11 Solid	% Moisture: 22.	7		npled: 06/17/2015 1017 ceived: 06/20/2015 1045
	8	260C Volatile Organic Com	ounds by GC/N	ns	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5035 1.0 06/30/2015 1904 06/25/2015 1542	Analysis Batch: 580-1 Prep Batch: 580-1	93241 Lat Init	trument ID: b File ID: tial Weight/Volume: al Weight/Volume:	TAC001 F3015016.D 4.227 g 5 mL
Analyte	DryWt Correct		Qualifier	MDL	RL
Methylene Chlorid m-Xylene & p-Xyle Naphthalene n-Butylbenzene N-Propylbenzene o-Xylene sec-Butylbenzene Styrene t-Butylbenzene Tert-amyl methyl e Tetrachloroethene trans-1,2-Dichloro trans-1,3-Dichloro Trichloroethene Trichlorofluoromet Vinyl chloride	ether ethene propene	ND ND ND ND ND ND ND ND ND ND ND ND ND N	- FAIL	21 5.5 6.4 6.4 4.7 5.5 5.1 4.4 5.6 6.6 9.7 4.7 6.9 13 5.6 11 13	46 73 73 73 73 73 73 73 73 73 73
Surrogate 1,2-Dichloroethan 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 104 100 91 103 89	Qualifier	Acceptar 71 - 136 70 - 120 75 - 132 80 - 120 65 - 140	nce Limits

MW 7-30-15 07/27/2015

#### Client: Ecology and Environment, Inc.

### Job Number: 580-51018-1

Client Sample ID	15244102				
Lab Sample ID: Client Matrix:	580-51018-11 Solid	% Moisture	e: 22.7		npled: 06/17/2015 1017 ceived: 06/20/2015 1045
	8260	)C Volatile Organi	c Compounds by	GC/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5035 1.0 06/30/2015 1904 06/25/2015 1542	Analysis Batch: Prep Batch:	580-193607 580-193241	Instrument ID: Lab File ID: Initial Weight/Volume: Final Weight/Volume:	TAC001 F3015016.D 4.227 g 5 mL
Tentatively Identified Compounds		Number TIC's F	ound: 3		
Cas Number	Analyte		RT	Est. Result (ug	/Kg) Qualifier
a yan mula bandar dan kutan katalah kana da bara da kuta da k	Unknown	n gan san an a	6.69	45000	CJ AD
79-20-9	Acetic acid, methyl ester		6.72	57000	TUN 1
110-54-3	Hexane		7.97	13000	TT WIT

MW 7=30-

07/27/2015

## Client: Ecology and Environment, Inc.

Client Sample ID:	15244103							
Lab Sample ID:	580-51018-12				0	ate Sam	pled: 06/1	7/2015 1130
Client Matrix:	Solid	% Moisture	e: 51.5		[	Date Rec	eived: 06/2	0/2015 1045
	826	0C Volatile Organi	c Compound	s by G	C/MS			
Analysis Method:	8260C	Analysis Batch:	580-193607	-	Instrument ID:		TAC001	
Prep Method:	5035	Prep Batch:	580-193241		Lab File ID:		F3015017	.D
Dilution:	1.0				Initial Weight/V	olume:	4.573 g	
Analysis Date:	06/30/2015 1935				Final Weight/V		5 mL	
Prep Date:	06/25/2015 1542							
Analyte	DryWt Corrected	: Y Result (u	a/Ka) (	Qualifi	er MDL		RL	
1,1,1,2-Tetrachlor		ND		lin of the Carlor and S	13	haan baran karan karan baran bara Baran baran bara	130	
1,1,1-Trichloroetha		ND			19		130	Į.
1,1,2,2-Tetrachlor	oethane	ND			7.6		33	
1,1,2-Trichloroetha		ND			9.3		40	
1,1-Dichloroethan		ND			14		130	1
1,1-Dichloroethen		ND			16		66	
1,1-Dichloroprope		ND			18		130	1
1,2,3-Trichloroben		ND			10		130	
1,2,3-Trichloropro		ND			38		130	
1,2,4-Trichloroben 1,2,4-Trimethylber		ND ND			13 8.0		130	(
1,2-Dibromo-3-Ch		ND			8.6		130 660	
1,2-Dibromoethan		ND			11		53	1
1,2-Dichlorobenze		ND			39		130	
1,2-Dichloroethan		ND			11		53	1
1,2-Dichloropropa		ND			8.0		40	
1,3,5-Trimethylber	nzene	ND			9.6		130	1
1,3-Dichlorobenze	ne	NØ			35		200	
1,3-Dichloropropa	ne	NØ			18		130	
1,4-Dichlorobenze		NØ			36		200	
2,2-Dichloropropa	ne	NØ			16		130	
2-Chlorotoluene		ND			11		130	r
4-Chlorotoluene		NAMM		0	9.9		130	r
4-Isopropyltoluene	9	52 ND		JA	9.3		130	2
Benzene Bromobenzene		ND		`	12 8.0		53	{
Bromochlorometha	ano	ND			15		130 130	
Bromodichlorome		ND			4.6		130	
Bromoform	liano	ND			22		130	
Bromomethane		ND		the strength to pay the strength of the	44	a biogram of the second se	460	FNINK
Carbon tetrachlori	de	ND			13		66	U.
Chlorobenzene		NÞ		٣	32		130	V A
Chloroethane		NØ	No. of Concession, Name of Street, or other	Anomerican	53	and the subscription of th	1300	-HONK
Chloroform		NÞ			14		130	U.
Chloromethane		NФ	,	Mus	33		330	5
cis-1,2-Dichloroet		NØ		1400	16		130	
cis-1,3-Dichloropro		NÞ			6.0		53	1
Dibromochlorome	tnane	ND			9.3		66	
Dibromomethane Dichlorodifluorome	athana				43		200	1
Diisopropyl ether					22 12		130 130	P
Ethyl t-butyl ether		ND			12		130	1
Ethylbenzene		ND			6.6		130	
Hexachlorobutadi	ene	ND			60		270	
Isopropylbenzene		ND			8.6		130	Y
Methyl tert-butyl e		ND			20		130	4
TestAmerica Sea	ttle	Page 10	65 of 5269		/	2,		07/27/2015

MW 7-30-15

## Client: Ecology and Environment, Inc.

Client Sample ID:	15244103				
Lab Sample ID: Client Matrix:	580-51018-12 Solid	% Moisture: 51.	5		npled: 06/17/2015 1130 ceived: 06/20/2015 1045
	8	260C Volatile Organic Com	ounds by GC/MS		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5035 1.0 06/30/2015 1935 06/25/2015 1542	Analysis Batch: 580-1 Prep Batch: 580-1	93241 Lab Fil Initial V	nent ID: le ID: Veight/Volume: Veight/Volume:	TAC001 F3015017.D 4.573 g 5 mL
Analyte	DryWt Correct	ted: Y Result (ug/Kg)	Qualifier	MDL	RL
Methylene Chlorid m-Xylene & p-Xyle Naphthalene n-Butylbenzene N-Propylbenzene o-Xylene sec-Butylbenzene Styrene t-Butylbenzene Tert-amyl methyl e Tetrachloroethene Toluene trans-1,2-Dichloro trans-1,3-Dichloro Trichloroethene Trichlorofluoromet Vinyl chloride	ether ethene propene	ND ND ND ND ND ND ND ND ND ND ND ND ND N	JBRCZ	38 9.9 12 12 8.6 9.9 9.3 8.0 10 12 18 8.6 13 23 10 20 24	83 130 130 130 130 130 130 130 13
Surrogate 1,2-Dichloroethan 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 104 102 93 99 89	Qualifier	Acceptar 71 - 136 70 - 120 75 - 132 80 - 120 65 - 140	

07/27/2015 MW7-30-

Job Number: 580-51018-1

#### **Client Sample ID:** 15244103 Lab Sample ID: 580-51018-12 Date Sampled: 06/17/2015 1130 Client Matrix: Solid % Moisture: 51.5 Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-193607 Instrument ID: TAC001 Prep Method: 5035 Prep Batch: 580-193241 Lab File ID: F3015017.D Dilution: 1.0 Initial Weight/Volume: 4.573 g Analysis Date: 06/30/2015 1935 Final Weight/Volume: 5 mL Prep Date: 06/25/2015 1542 **Tentatively Identified Compounds** Number TIC's Found: 2 Cas Number Analyte RT Est. Result (ug/Kg) Qualifier Unknown 6.71 160000 110-54-3 Hexane 7.97 21000

Client: Ecology and Environment, Inc.

07/27/2015 NW 730

## Client: Ecology and Environment, Inc.

Client Sample ID:	15244104				
Lab Sample ID: Client Matrix:	580-51018-13 Solid	% Moistur	e: 77.8		npled: 06/17/2015 1210 ceived: 06/20/2015 1045
L		8260C Volatile Organi	c Compounds by	y GC/MS	
Analysis Method:	8260C	Analysis Batch:	580-193750	Instrument ID:	TAC001
Prep Method:	5035	Prep Batch:	580-193241	Lab File ID:	G0115008.D
Dilution:	1.0			Initial Weight/Volume:	3.362 g
Analysis Date:	07/01/2015 1600			Final Weight/Volume:	5 mL
Prep Date:	06/25/2015 1542				
Analyte	DryWt Correc	AND TRACK AND A DESCRIPTION OF A DATA OF	ig/Kg) Qua	alifier MDL	RL
1,1,1,2-Tetrachlor		ND		39	410
1,1,1-Trichloroetha				57 23	410
1,1,2,2-Tetrachlore 1,1,2-Trichloroetha		ND		23	100 120
1,1-Dichloroethan		ND		43	410
1,1-Dichloroethene		ND		50	200
1,1-Dichloroprope		ND		54	410
1,2,3-Trichloroben		ND		32	410
1,2,3-Trichloroprop	pane	ND		120	410
1,2,4-Trichloroben		ND		40	410
1,2,4-Trimethylber		ND		24	410
1,2-Dibromo-3-Ch		ND		26	2000
1,2-Dibromoethan		ND ND		35 120	160
1,2-Dichlorobenze		ND		34	410 160
1,2-Dichloropropa		ND		24	120
1,3,5-Trimethylbenzene		ND		30	410
1,3-Dichlorobenzene		ND		110	610
1,3-Dichloropropa		ND		56	410
1,4-Dichlorobenze		ΝD		110	610
2,2-Dichloropropa	ne	ND		49	410
2-Chlorotoluene		ND		35	410
4-Chlorotoluene		ND		. 31	410
4-Isopropyltoluene Benzene	3			29 36	410 160
Bromobenzene		ND		24	410
Bromochlorometha	ane	ND		47	410
Bromodichloromet		ND		14	410
Bromoform		ΝD		66	410 V 0
Bromomethane		ND		140	
Carbon tetrachlori	de	ND		39	200
Chlorobenzene		ND		100	410
Chloroethane Chloroform		ND			4100 WK
Chloromethane				100	1000
cis-1,2-Dichloroeth	nene	ND		50	410
cis-1,3-Dichloropro		ND		18	160
Dibromochloromet		NØ		29	200
Dibromomethane		NP		130	610
Dichlorodifluorome	ethane	NÞ		66	410 J
Diisopropyl ether		NP		36	410
Ethyl t-butyl ether		NP		53	410
Ethylbenzene Hexachlorobutadie	ana	ND		20 180	410 810
Isopropylbenzene				26	410
Methyl tert-butyl e		ND		61	410
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		Mr		•.	¥
TestAmerica Sea	ttle	Page 1	68 of 5269		07/27/2015

MW7-30-15

#### Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244104 Lab Sample ID: 580-51018-13 Date Sampled: 06/17/2015 1210 **Client Matrix:** Solid % Moisture: 77.8 Date Received: 06/20/2015 1045 8260C Volatile Organic Compounds by GC/MS Analysis Method: 8260C Analysis Batch: 580-193750 Instrument ID: TAC001 Prep Method: 5035 Prep Batch: 580-193241 Lab File ID: G0115008.D Dilution: 1.0 Initial Weight/Volume: 3.362 g Analysis Date: 07/01/2015 1600 Final Weight/Volume: 5 mL Prep Date: 06/25/2015 1542 Analyte DryWt Corrected: Y Result (ug/Kg) Qualifier RL MDL Methylene Chloride 220 120 250 JGZ 410 m-Xylene & p-Xylene ND 31 Naphthalene ND 36 410 n-Butylbenzene ND 36 410 N-Propylbenzene ND 26 410 ND o-Xylene 31 410 sec-Butylbenzene ND 29 410 Styrene ND 24 410 t-Butylbenzene ND 32 410 Nþ Tert-amyl methyl ether 37 410 Tetrachloroethene NOW 54 200 V 250 Toluene 26 410 trans-1,2-Dichloroethene ND 39 410 trans-1,3-Dichloropropene ND. 71 410 ND Trichloroethene 32 240 Trichlorofluoromethane 60 ND 410 Vinyl chloride 72 16 **₩** Surrogate %Rec Qualifier Acceptance Limits 1,2-Dichloroethane-d4 (Surr) 110 71 - 136 4-Bromofluorobenzene (Surr) 97 70 - 120 Dibromofluoromethane (Surr) 96 75 - 132 Toluene-d8 (Surr) 101 80 - 120 Trifluorotoluene (Surr) 91 65 - 140

MW7-30

07/27/2015

Client: Ecology and Environment, Inc.

## Job Number: 580-51018-1

Client Sample ID	: 15244104				
Lab Sample ID:	580-51018-13		77.0		npled: 06/17/2015 1210
Client Matrix:	Solid	% Moistur	e: 77.8	Date Rec	ceived: 06/20/2015 1045
		8260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method:	8260C	Analysis Batch:	580-193750	Instrument ID:	TAC001
Prep Method:	5035	Prep Batch:	580-193241	Lab File ID:	G0115008.D
Dilution:	1.0			Initial Weight/Volume:	3.362 g
Analysis Date:	07/01/2015 1600			Final Weight/Volume:	5 mL
Prep Date:	06/25/2015 1542				
Tentatively Ident	ified Compounds	Number TIC's F	ound: 1		
Cas Number	Analyte		RT	Est. Result (ug	/Kg) Qualifier
la selen leinenen leinnen konntraktionaan kalturation on	Unknown	analor pagna ananan na ang ang ang ang ang ang a	6.68	220000	TRUS

MW7-30 15

Client: Ecology and Environment, Inc.

Lab Sample ID: Client Matrix:	580-51018-14 Solid	% Moisture	e: 63.9		Date Sampled: 06/1 Date Received: 06/2	
	8260	C Volatile Organi	c Compounds by	GC/MS		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5035 1.0 07/01/2015 1631 06/25/2015 1542	Analysis Batch: Prep Batch:	580-193750 580-193241	Instrument ID: Lab File ID: Initial Weight/\ Final Weight/\	•	9.D
Analyte	DryWt Corrected:	Y Result (u	g/Kg) Qua	lifier MDL	RL	
1,1,1,2-Tetrachloro	IN THE REPORT OF THE	ND		22	230	J
1,1,1-Trichloroetha		ND		32	230	ኘ
1,1,2,2-Tetrachloro	bethane	ND		13	57	
1,1,2-Trichloroetha	ine	ND		16	68	1
1,1-Dichloroethane	)	ND		24	230	
1,1-Dichloroethene		ND		28	110	
1,1-Dichloroproper		ND		30	230	
1,2,3-Trichlorobena		ND		18	230	1
1,2,3-Trichloroprop		ND		65	230	
1,2,4-Trichlorobenz		ND		22	230	
1,2,4-Trimethylben		ND		14	230	1
1,2-Dibromo-3-Chl		ND		15	1100	1
1,2-Dibromoethane 1,2-Dichlorobenzer		ND ND		19 68	91	
1,2-Dichloroethane		ND		19	230 91	
1,2-Dichloropropar		ND		19	68	
1,3,5-Trimethylben		ND		16	230	1
1,3-Dichlorobenzei		ND		60	340	1
1,3-Dichloropropar		ND		31	230	1
1,4-Dichlorobenzer		ND		61	340	)
2,2-Dichloropropar		ND		27	230	1
2-Chlorotoluene		ND		19	230	
4-Chlorotoluene		ифи~		17	230	V
4-Isopropyltoluene		120	J C	2 16	230	,
Benzene		ND	0	20	91 🕻	
Bromobenzene		ND		14	230	1
Bromochlorometha		ND		26	230	
Bromodichloromet	hane	ND		8.0	230	
Bromoform Bromomethane		ND		37	230	FAR
Bromometnane Carbon tetrachlorid	lo	ND ND		<del>76</del> 22	800- 110	
Chlorobenzene	16	ND		56	230	
Chloroethane		ND				Firm R
Chloroform		ND		24	230	
Chloromethane		ND		57	570	1-T
cis-1,2-Dichloroeth	ene	NØ		28	230	
cis-1,3-Dichloropro		NØ		10	91	
Dibromochloromet		NØ		16	110	
Dibromomethane		NФ		75	340	1.
Dichlorodifluorome	thane	NØ		37	230	5
Diisopropyl ether		ND		20	230	
Ethyl t-butyl ether		NÞ		30	230	
Ethylbenzene		ND		11	230	1
Hexachlorobutadie	ne	ŅD		100	460	1
sopropylbenzene	h	ND		15	230,	
Methyl tert-butyl et	ner			34	230	শ
		Re-				

MW7-5

Client: Ecology and Environment, Inc.

## Job Number: 580-51018-1

Client Sample ID:	: 15244105				
Lab Sample ID: Client Matrix:	580-51018-14 Solid	% Moisture:	63.9		npled: 06/17/2015 1630 evived: 06/20/2015 1045
	82	260C Volatile Organic C	ompounds by GC/	/MS	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8260C 5035 1.0 07/01/2015 1631 06/25/2015 1542	,	80-193241 La In	nstrument ID: ab File ID: itial Weight/Volume: inal Weight/Volume:	TAC001 G0115009.D 3.531 g 5 mL
Analyte	DryWt Correcte		g) Qualifier	MDL	RL
Methylene Chlorid m-Xylene & p-Xyle Naphthalene n-Butylbenzene N-Propylbenzene o-Xylene sec-Butylbenzene Styrene t-Butylbenzene Tert-amyl methyl e Tetrachloroethene Toluene trans-1,2-Dichloro trans-1,3-Dichloro Trichloroethene Trichlorofluoromet Vinyl chloride	ether ethene propene	68 ND ND ND ND ND ND ND ND ND ND ND ND ND	J Ku Q	65 17 20 20 15 17 16 14 18 20 30 15 22 40 18 34 40	140 230 230 230 230 230 230 230 23
Surrogate 1,2-Dichloroethan 4-Bromofluoroben Dibromofluoromet Toluene-d8 (Surr) Trifluorotoluene (S	zene (Surr) hane (Surr)	%Rec 111 98 95 101 84	Qualifier	Acceptan 71 - 136 70 - 120 75 - 132 80 - 120 65 - 140	ice Limits

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**TestAmerica Seattle** 

Client: Ecology and Environment, Inc.

Client Sample ID	: 15244105				
Lab Sample ID:	580-51018-14			Date Sar	npled: 06/17/2015 1630
Client Matrix:	Solid	% Moisture	e: 63.9	Date Rec	ceived: 06/20/2015 1045
	8	260C Volatile Organi	c Compounds by	GC/MS	
Analysis Method:	8260C	Analysis Batch:	580-193750	Instrument ID:	TAC001
Prep Method:	5035	Prep Batch:	580-193241	Lab File ID:	G0115009.D
Dilution:	1.0			Initial Weight/Volume:	3.531 g
Analysis Date:	07/01/2015 1631			Final Weight/Volume:	5 mL
Prep Date:	06/25/2015 1542				
Tentatively Identified Compounds		Number TIC's F	ound: 1		
Cas Number	Analyte		RT	Est. Result (ug	/Kg) Qualifier
110-54-3	Hexane	ngan ganaga yé nanganga miginé yéngangan ang papangan nang papangan nang papangan nang kabupatén nangan kabupat	7.97	28000	I MW MJ

MW 2015 7201 57/27/2015

ecology and environment, inc. Global Environmental Specialists

720 Third Avenue, Suite 1700 Seattle, Washington 98104 Tel: (206) 624-9537, Fax: (206) 621-9832

#### MEMORANDUM

DATE:	July 30, 2015
TO:	Linda Ader, START-IV Project Manager, E & E, Seattle, WA
FROM:	Mark Woodke, START-IV Chemist, E & E, Seattle, Washington
SUBJ:	Organic Data Quality Assurance Review, Holy Cross-AK Big Lake Site, Holy Cross, Alaska
REF:	TDD: 14-08-0001 PAN: 1004530.0005.013.01

The data quality assurance review of 5 soil and 7 water samples collected from the Holy Cross-AK Big Lake site located in Holy Cross, Alaska, has been completed. Analysis for Chlorinated Pesticides (EPA Method 8081) and Polychlorinated Biphenyls (PCBs - EPA Method 8082) was performed by Test America, Inc., Tacoma, WA. All sample analyses were evaluated following EPA's Stage 2B and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

15244116	15244117	15244118	15244119	15244120
15244121	15244122	15244101	15244102	15244103
15244104	15244105			

#### **Data Qualifications:**

#### 1. Sample Holding Times: Acceptable.

The samples were maintained at  $< 6^{\circ}$ C. The samples were collected on June 17 and 18, 2015, extracted by July 30, 2015, and were analyzed by July 21, 2015, therefore meeting QC criteria of less than 7 days between collection and water sample extraction (14 days for soils) and less than 40 days between extraction and analysis.

#### 2. Instrument Performance: Acceptable.

The surrogate retention time percent difference between the initial calibration standards and the remaining standards and samples was  $\leq 0.3\%$  for capillary column analyses.

#### 3. Initial and Continuing Calibration: Acceptable.

All initial calibration relative standard deviations (RSDs) were within QC limits. All continuing calibration % differences (% D) were within QC limits except some high recovery outliers (no actions were taken based on these outliers as there were no detections in the associated samples) and two low Aroclor 1268 recoveries and one toxaphene low recovery (no actions were taken as there were no associated samples).

### 4. Error Determination: Not Provided.

Samples necessary for bias and precision determination were not provided to the laboratory. All samples were flagged RND (Recovery Not Determined) and PND (Precision Not Determined), although the flags are not found on the Form I's.

#### 5. Blanks: Satisfactory.

A method blank was prepared at the required frequency of every time samples were extracted for each matrix and for each concentration level, or every 20 samples, whichever is greater, and for each analytical system. No target analytes were detected in any blanks except endrin aldehyde (0.881 ug/L) associated with the water samples; no actions were taken as endrin aldehyde was not detected in any water samples.

# 6. Performance Evaluation Samples: Not Provided.

Performance evaluation samples were not provided to the laboratory.

### 7. System Monitoring Compounds (SMCs): Acceptable.

All recoveries of the SMCs were within the established control limits.

#### 8. Blank and Matrix Spikes: Acceptable.

Recoveries of all spiked analytes were within the appropriate control limits.

#### 9. Duplicates: Acceptable.

Relative Percent Differences (RPDs) of all spiked analytes were within the required control limits.

### 10. Compound Identification: Acceptable.

All positive results were dual-column confirmed with differences between the columns less than 25%.

## 11. Target Compound Quantitation and Quantitation Limits: Acceptable.

Sample results and quantitation limits were correctly calculated.

#### 12. Laboratory Contact

No laboratory contact was required.

#### 13. Overall Assessment

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

#### Data Qualifiers and Definitions

- U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- JQ The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).
- N The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244116 Lab Sample ID: 580-51018-1 Date Sampled: 06/17/2015 1440 **Client Matrix:** Water Date Received: 06/20/2015 1045 8081B Organochlorine Pesticides (GC) Analysis Method: 8081B Analysis Batch: 580-193563 Instrument ID: **TAC034** Prep Method: 3510C Prep Batch: 580-193019 Initial Weight/Volume: 975.5 mL Dilution: 1.0 Final Weight/Volume: 10 mL Analysis Date: 07/01/2015 0013 Injection Volume: 1 uL Prep Date: 06/23/2015 1723 Result Type: PRIMARY Analyte Result (ug/L) Qualifier MDL RL Aldrin ND 0.0031 0.010 alpha-BHC ND 0.0027 0.010 beta-BHC ND 0.0015 0.021 delta-BHC ND 0.0031 0.010 gamma-BHC (Lindane) ND 0.0031 0.010 4,4'-DDD ND 0.0031 0.021 ND 4,4'-DDE 0.0011 0.021 4,4'-DDT ND 0.0031 0.021 ND Dieldrin 0.0031 0.021 Endosulfan I ND 0.0031 0.021 Endosulfan II ND 0.021 0.0031 Endosulfan sulfate ND 0.0031 0.021 ND Endrin 0.0031 0.021 ND Endrin aldehyde 0.0010 0.051 ND Heptachlor 0.010 0.0031 ND Heptachlor epoxide 0.0031 0.010 ND Methoxychlor 0.0031 0.10 Endrin ketone ND 0.0031 0.021 Toxaphene Nþ 0.28 1.0 alpha-Chlordane ND 0.0031 0.010 gamma-Chlordane 0.0011 0.010 ND TM) Surrogate %Rec Qualifier Acceptance Limits Tetrachloro-m-xylene 91 45 - 123

98

33 - 133

DCB Decachlorobiphenyl

Client: Ecology and Environment, Inc.

#### Job Number: 580-51018-1

 Client Sample ID:
 15244117

 Lab Sample ID:
 580-51018-2

 Client Matrix:
 Water

Date Sampled: 06/17/2015 1510 Date Received: 06/20/2015 1045

8081B Organochlorine Pesticides (GC)						
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8081B 3510C 1.0 07/01/2015 0030 06/23/2015 1723	Analysis Batch: Prep Batch:	580-193563 580-193019	Initial Final Inject	iment ID: Weight/Volume: Weight/Volume: tion Volume: It Type:	TAC034 1020.8 mL 10 mL 1 uL PRIMARY
Analyte		Result (u	g/L)	Qualifier	MDL	RL
Aldrin alpha-BHC beta-BHC gamma-BHC (Lind 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Heptachlor Heptachlor Heptachlor Endrin ketone Toxaphene alpha-Chlordane gamma-Chlordane	e				0.0029 0.0025 0.0015 0.0029	0.0098 0.0098 0.020 0.0098 0.0098 0.020 0.029 0.098 0.098 0.0098 0.0098 0.0098 0.0098 0.0098 0.0098 0.0098 0.0098
Surrogate		%Rec		Qualifier	Acceptar	ce Limits
Tetrachloro-m-xyle DCB Decachlorob		85 89	ng man pang mga pang mga ng	a nigan in paramatan da ana ana d	45 - 123 33 - 133	مىسەتەتلەرلەردە ۋە تەرىپى ئۆتەر بەرىپى ب

MW 730

Job Number: 580-51018-1

Client: Ecology and Environment, Inc.

**Client Sample ID:** 

Lab Sample ID:

Client Matrix:

# 15244118 Date Sampled: 06/17/2015 1600 580-51018-3 Date Sampled: 06/20/2015 1600 Water Date Received: 06/20/2015 1045

		8081B Organochle	orine Pestici	des (GC)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8081B 3510C 1.0 07/01/2015 0048 06/23/2015 1723	Analysis Batch: Prep Batch:	580-193563 580-193019	ə İni Fi İnj	strument ID: itial Weight/Volume: nal Weight/Volume: jection Volume: esult Type:	TAC034 1051.2 mL 10 mL 1 uL PRIMARY
Analyte		Result (u	ıg/L)	Qualifier	MDL	RL
Aldrin alpha-BHC beta-BHC delta-BHC gamma-BHC (Lind 4,4'-DDD 4,4'-DDT Dieldrin Endosulfan I Endosulfan I Endosulfan sulfate Endrin Endrin aldehyde Heptachlor Heptachlor Heptachlor Endrin ketone Toxaphene alpha-Chlordane gamma-Chlordane	e				0.0029 0.0025 0.0014 0.0029	0.0095 0.0095 0.019 0.0095 0.019 0.025 0.0095 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0
Surrogate		%Rec		Qualifier	Acceptar	nce Limits
Tetrachloro-m-xyl		87			45 - 123	lands an a finan di annan a finan (prindige na fingge n' antino en chur n' annan a dhar a'
DCB Decachlorob	piphenyl	95			33 - 133	

MW ZZOTS

Client: Ecology and Environment, Inc.

**Client Sample ID:** 15244119 Lab Sample ID: 580-51018-4 Date Sampled: 06/17/2015 1515 **Client Matrix:** Water Date Received: 06/20/2015 1045 8081B Organochlorine Pesticides (GC) 8081B Analysis Method: Analysis Batch: 580-193563 Instrument ID: **TAC034** Prep Method: 3510C Prep Batch: 580-193019 Initial Weight/Volume: 971.7 mL Dilution: 1.0 Final Weight/Volume: 10 mL 07/01/2015 0105 Analysis Date: Injection Volume: 1 uL 06/23/2015 1723 Prep Date: Result Type: PRIMARY Analyte Result (ug/L) Qualifier MDL RL Aldrin 0.0031 0.010 ND alpha-BHC ND 0.0027 0.010 ND beta-BHC 0.0015 0.021 ΝD delta-BHC 0.0031 0.010 ŊD gamma-BHC (Lindane) 0.010 0.0031 0.021 4,4'-DDD 0.0031 4,4'-DDE 0.021 0.0011 4,4'-DDT 0.0031 0.021 Dieldrin 0.0031 0.021 Endosulfan I 0.0031 0.021 Endosulfan II 0.0031 0.021 Endosulfan sulfate 0.0031 0.021 Endrin 0.0031 0.021 Endrin aldehyde 0.0010 0.051 Heptachlor 0.0031 0.010 Heptachlor epoxide 0.0031 0.010 Methoxychlor 0.0031 0.10 Endrin ketone 0.0031 0.021 NÞ Toxaphene 0.28 1.0 Nþ alpha-Chlordane 0.0031 0.010 NAMU 0.0011 0.010 gamma-Chlordane %Rec Qualifier Acceptance Limits Surrogate Tetrachloro-m-xylene 83 45 - 123 33 - 133 DCB Decachlorobiphenyl 97

7-30-15

Client: Ecology and Environment, Inc.

#### Job Number: 580-51018-1

Client Sample ID:	15244120
Lab Sample ID:	580-51018-5
Client Matrix:	Water

Date Sampled: 06/18/2015 1230 Date Received: 06/20/2015 1045

Analysis Method:       8081B       Analysis Batch:       580-193563       Instrument ID:       TAC034         Prep Method:       3510C       Prep Batch:       580-193019       Initial Weight/Volume:       98.3       mL         Dilution:       1.0       Analysis Date:       07/01/2015 0122       Final Weight/Volume:       10       mL         Analysis Date:       06/23/2015 1723       Result (ug/L)       Qualifier       MDL       RL         Analysis Pate:       06/23/2015 1723       ND       0.0032       0.011         Analysis Alter:       ND       0.0032       0.011         Japha-BHC       ND       0.0028       0.011         detta-BHC       ND       0.0032       0.011         gama-BHC (Lindane)       ND       0.0032       0.021         4,4'-DDE       ND       0.0032       0.021         4,4'-DDE       ND       0.0032       0.021         Endosulfan I       ND       0.0032       0.021         Endosulfan sulfate       ND       0.			8081B Organochle	orine Pesticio	des (GC)			
Aldrin         ND         0.0032         0.011           alpha-BHC         ND         0.0028         0.011           beta-BHC         ND         0.0016         0.021           delta-BHC         ND         0.0032         0.011           gamma-BHC (Lindane)         ND         0.0032         0.011           4,4*-DDD         ND         0.0032         0.021           4,4*-DDT         ND         0.0032         0.021           1,4,4*-DDT         ND         0.0032         0.021           1,4,4*-DDT         ND         0.0032         0.021           1,4,4*-DT         ND         0.0032         0.021           1,4,4*-DE         ND         0.0032         0.021           1,4,4*-DT         ND         0.0032         0.021           Endosulfan I         ND         0.0032         0.021           Endosulfan I         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.021           Heptachlor         ND         0.0032         0.011           Heptachlor         ND         0.0032         0.	Prep Method: Dilution: Analysis Date:	3510C 1.0 07/01/2015 0122			) Initi Fina Inje	al Weight/Volume: al Weight/Volume: ection Volume:	938.3 mL 10 mL 1 uL	
Aldrin         ND         0.0032         0.011           alpha-BHC         ND         0.0028         0.011           beta-BHC         ND         0.0016         0.021           delta-BHC         ND         0.0032         0.011           gamma-BHC (Lindane)         ND         0.0032         0.011           4,4'-DDD         ND         0.0032         0.021           4,4'-DDT         ND         0.0032         0.021           1,4,4'-DDT         ND         0.0032         0.021           1,4,4'-DDT         ND         0.0032         0.021           1,4,4'-DDT         ND         0.0032         0.021           1,4,4'-DDT         ND         0.0032         0.021           Endosulfan I         ND         0.0032         0.021           Endosulfan I         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032         0.011           Methoxychlor         ND         0.0032 </td <td>Analyte</td> <td></td> <td>Result (u</td> <td>ia/L)</td> <td>Qualifier</td> <td>MDL</td> <td>RL ,</td> <td>• •</td>	Analyte		Result (u	ia/L)	Qualifier	MDL	RL ,	• •
alpha-BHC         ND         0.0028         0.011           beta-BHC         ND         0.0016         0.021           delta-BHC         ND         0.0032         0.011           gamma-BHC (Lindane)         ND         0.0032         0.011           4,4'-DDD         ND         0.0032         0.021           4,4'-DDE         ND         0.0032         0.021           4,4'-DDT         ND         0.0032         0.021           4,4'-DDT         ND         0.0032         0.021           4,4'-DDT         ND         0.0032         0.021           Liddrin         ND         0.0032         0.021           Endosulfan I         ND         0.0032         0.021           Endosulfan II         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032         0.011           Heptachlor poxide         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032         0.021           Toxaphene         ND         0.0032 </td <td>the state in the state of the s</td> <td>n y szy a kezőresése, hol szerelek kezes es zertészek lesszek mesze terüléte kéletesések a</td> <td>Course for the state of the sta</td> <td></td> <td>化活干化 经上面出生运行计 网络化化的新闻的一</td> <td>the second section of the second second second second second second second second second second second second s</td> <td>CONTRACTOR AND A REAL PROPERTY A REAL PROPERTY AND A REAL PROPERTY</td> <td></td>	the state in the state of the s	n y szy a kezőresése, hol szerelek kezes es zertészek lesszek mesze terüléte kéletesések a	Course for the state of the sta		化活干化 经上面出生运行计 网络化化的新闻的一	the second section of the second second second second second second second second second second second second s	CONTRACTOR AND A REAL PROPERTY A REAL PROPERTY AND A REAL PROPERTY	
beta-BHC         ND         0.0016         0.021           delta-BHC         ND         0.0032         0.011           gamma-BHC (Lindane)         ND         0.0032         0.011           4,4'-DDD         ND         0.0032         0.021           4,4'-DDE         ND         0.0032         0.021           4,4'-DDT         ND         0.0032         0.021           bieldrin         ND         0.0032         0.021           bieldrin         ND         0.0032         0.021           Endosulfan I         ND         0.0032         0.021           Endosulfan II         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.011           Heptachlor         ND         0.0032         0.011           Heptachlor         ND         0.0032         0.011           Heptachlor         ND         0.0032         0.011           Heptachlor         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032 <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.0028</td> <td></td> <td>1</td>						0.0028		1
delta-BHC         ND         0.0032         0.011           gamma-BHC (Lindane)         ND         0.0032         0.011           4,4'-DDD         ND         0.0032         0.021           4,4'-DDT         ND         0.0032         0.021           4,4'-DDT         ND         0.0032         0.021           4,4'-DDT         ND         0.0032         0.021           bieldrin         ND         0.0032         0.021           Endosulfan I         ND         0.0032         0.021           Endosulfan I         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endrin         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.011           Heptachlor         ND         0.0032         0.011           Heptachlor         ND         0.0032         0.021           Heptachlor         ND         0.0032         0.011           Methoxychlor         ND         0.0032         0.011           Indrin ketone         ND         0.0032						0.0016		
4,4'-DDD       ND       0.0032       0.021         4,4'-DDE       ND       0.0012       0.021         4,4'-DDT       ND       0.0032       0.021         Dieldrin       ND       0.0032       0.021         Dieldrin       ND       0.0032       0.021         Endosulfan I       ND       0.0032       0.021         Endosulfan III       ND       0.0032       0.021         Endosulfan sulfate       ND       0.0032       0.021         Endrin       ND       0.0032       0.021         Endrin       ND       0.0032       0.021         Endrin aldehyde       ND       0.0032       0.021         Heptachlor       ND       0.0032       0.011         Heptachlor epoxide       ND       0.0032       0.011         Methoxychlor       ND       0.0032       0.021         Toxaphene       ND       0.0032       0.021         Indrin ketone       ND       0.0032       0.021         Toxaphene       ND       0.0032       0.011         gamma-Chlordane       ND       0.0032       0.011         gamma-Chlordane       ND       0.0012       0.011 <td>delta-BHC</td> <td></td> <td></td> <td></td> <td></td> <td>0.0032</td> <td>0.011</td> <td></td>	delta-BHC					0.0032	0.011	
4,4'-DDE       ND       0.0012       0.021         4,4'-DDT       ND       0.0032       0.021         Dieldrin       ND       0.0032       0.021         Endosulfan I       ND       0.0032       0.021         Endosulfan I       ND       0.0032       0.021         Endosulfan II       ND       0.0032       0.021         Endosulfan sulfate       ND       0.0032       0.021         Endrin       ND       0.0032       0.021         Endrin aldehyde       ND       0.0032       0.021         Heptachlor       ND       0.0032       0.011         Heptachlor epoxide       ND       0.0032       0.011         Methoxychlor       ND       0.0032       0.011         Methoxychlor       ND       0.0032       0.021         Toxaphene       ND       0.0032       0.021         Indrin ketone       ND       0.0032       0.021         Toxaphene       ND       0.0032       0.011         gamma-Chlordane       ND       0.0032       0.011         Surrogate       %Rec       Qualifier       Acceptance Limits         Tetrachloro-m-xylene       88       45 - 123<	gamma-BHC (Lind	dane)	ND			0.0032	0.011	
4,4'-DDT       ND       0.0032       0.021         Dieldrin       ND       0.0032       0.021         Endosulfan I       ND       0.0032       0.021         Endosulfan II       ND       0.0032       0.021         Endosulfan sulfate       ND       0.0032       0.021         Endosulfan sulfate       ND       0.0032       0.021         Endrin Aldehyde       ND       0.0032       0.021         Endrin aldehyde       ND       0.0032       0.021         Heptachlor       ND       0.0032       0.011         Heptachlor epoxide       ND       0.0032       0.011         Methoxychlor       ND       0.0032       0.011         Methoxychlor       ND       0.0032       0.021         Toxaphene       ND       0.0032       0.011         alpha-Chlordane       ND       0.0032       0.011         gamma-Chlordane       ND       0.0032       0.011         Surrogate       %Rec       Qualifier       Acceptance Limits         Tetrachloro-m-xylene       88       45 - 123       45 - 123	4,4'-DDD		ND			0.0032	0.021	
Dieldrin         ND         0.0032         0.021           Endosulfan I         ND         0.0032         0.021           Endosulfan II         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endrin         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.021           Heptachlor         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032         0.011           Methoxychlor         ND         0.0032         0.011           Methoxychlor         ND         0.0032         0.021           Toxaphene         ND         0.0032         0.011           alpha-Chlordane         ND         0.0032         0.011           gamma-Chlordane         ND         0.0012         0.011           Surrogate         %Rec         Qualifier         Acceptance Limits           Tetrachloro-m-xylene         88         45 - 123         45 - 123	4,4'-DDE		ND			0.0012	0.021	1
Endosulfan I         ND         0.0032         0.021           Endosulfan II         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endrin         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.021           Heptachlor         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032         0.011           Methoxychlor         ND         0.0032         0.011           Endrin ketone         ND         0.0032         0.021           Toxaphene         ND         0.0032         0.011           alpha-Chlordane         ND         0.0032         0.011           gamma-Chlordane         ND         0.0012         0.011           Surrogate         %Rec         Qualifier         Acceptance Limits           Tetrachloro-m-xylene         88         45 - 123         45 - 123	4,4'-DDT		ND				0.021	1
Endosulfan II         ND         0.0032         0.021           Endosulfan sulfate         ND         0.0032         0.021           Endrin         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.021           Endrin aldehyde         ND         0.0032         0.021           Endrin aldehyde         ND         0.0011         0.053           Heptachlor         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032         0.011           Methoxychlor         ND         0.0032         0.11           Methoxychlor         ND         0.0032         0.021           Toxaphene         ND         0.0032         0.021           Toxaphene         ND         0.0032         0.011           gamma-Chlordane         ND         0.0032         0.011           Surrogate         %Rec         Qualifier         Acceptance Limits           Tetrachloro-m-xylene         88         45 - 123         45 - 123			ND					
Endosulfan sulfate         ND         0.0032         0.021           Endrin         ND         0.0032         0.021           Endrin aldehyde         ND         0.0011         0.053           Heptachlor         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032         0.011           Methoxychlor         ND         0.0032         0.11           Methoxychlor         ND         0.0032         0.11           Endrin ketone         ND         0.0032         0.021           Toxaphene         ND         0.0032         0.011           alpha-Chlordane         ND         0.0032         0.011           gamma-Chlordane         ND         0.0012         0.011           Surrogate         %Rec         Qualifier         Acceptance Limits           Tetrachloro-m-xylene         88         45 - 123         45 - 123			. 1-			+		
Endrin         ND         0.0032         0.021           Endrin aldehyde         ND         0.0011         0.053           Heptachlor         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032         0.011           Heptachlor epoxide         ND         0.0032         0.011           Methoxychlor         ND         0.0032         0.11           Endrin ketone         ND         0.0032         0.021           Toxaphene         ND         0.0032         0.011           alpha-Chlordane         ND         0.0032         0.011           gamma-Chlordane         ND         0.0012         0.011           Surrogate         %Rec         Qualifier         Acceptance Limits           Tetrachloro-m-xylene         88         45 - 123         45 - 123								
Endrin aldehydeND0.00110.053HeptachlorND0.00320.011Heptachlor epoxideND0.00320.011MethoxychlorND0.00320.11Endrin ketoneND0.00320.021ToxapheneND0.00320.011alpha-ChlordaneND0.00320.011gamma-ChlordaneND0.00120.011Surrogate%RecQualifierAcceptance LimitsTetrachloro-m-xylene8845 - 123		9						[
Heptachlor       ND       0.0032       0.011         Heptachlor epoxide       ND       0.0032       0.011         Methoxychlor       ND       0.0032       0.11         Endrin ketone       ND       0.0032       0.021         Toxaphene       ND       0.0032       0.021         alpha-Chlordane       ND       0.0032       0.011         gamma-Chlordane       ND       0.0012       0.011         Surrogate       %Rec       Qualifier       Acceptance Limits         Tetrachloro-m-xylene       88       45 - 123			. [					
Heptachlor epoxideND0.00320.011MethoxychlorND0.00320.11Endrin ketoneND0.00320.021ToxapheneND0.291.1alpha-ChlordaneND0.00320.011gamma-ChlordaneND0.00120.011Surrogate%RecQualifierAcceptance LimitsTetrachloro-m-xylene8845 - 123	•							
Methoxychlor         ND         0.0032         0.11           Endrin ketone         ND         0.0032         0.021           Toxaphene         ND         0.29         1.1           alpha-Chlordane         ND         0.0032         0.011           gamma-Chlordane         ND         0.0012         0.011           Surrogate         %Rec         Qualifier         Acceptance Limits           Tetrachloro-m-xylene         88         45 - 123								
Endrin ketoneND0.00320.021ToxapheneND0.291.1alpha-ChlordaneND0.00320.011gamma-ChlordaneND0.00120.011Surrogate%RecQualifierAcceptance LimitsTetrachloro-m-xylene8845 - 123		e						
ToxapheneND0.291.1alpha-ChlordaneND0.00320.011gamma-ChlordaneND0.00120.011Surrogate%RecQualifierAcceptance LimitsTetrachloro-m-xylene8845 - 123								
alpha-ChlordaneND0.00320.011gamma-ChlordaneND0.00120.011Surrogate%RecQualifierAcceptance LimitsTetrachloro-m-xylene8845 - 123								
gamma-ChlordaneNo0.00120.011Surrogate%RecQualifierAcceptance LimitsTetrachloro-m-xylene8845 - 123								
Surrogate%RecQualifierAcceptance LimitsTetrachloro-m-xylene8845 - 123								V
Tetrachloro-m-xylene 88 45 - 123	gamma-chiordane	3	14 mg/w			0.0012	0.011	Ŧ
	Surrogate		%Rec		Qualifier	Acceptar	ice Limits	
DCB Decachlorobiphenyl 103 33 - 133	Tetrachloro-m-xyle	ene	88	al neuronaiste destant och all somherkensind.		45 - 123	an an an an an an an an an an an an an a	denke met minnet het vereiktigteren.
	DCB Decachlorob	iphenyl	103			33 - 133		

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Client: Ecology and Environment, Inc.

#### Job Number: 580-51018-1

 Client Sample ID:
 15244121

 Lab Sample ID:
 580-51018-6
 Date Sampled: 06/17/2015 1440

 Client Matrix:
 Water
 Date Received: 06/20/2015 1045

		8081B Organochio	onne resucio	ies (GC)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8081B 3510C 1.0 07/01/2015 0357 06/23/2015 1758	Analysis Batch: Prep Batch:	580-193563 580-193019	ln Fi In	strument ID: itial Weight/Volume: nal Weight/Volume: jection Volume: esult Type:	TAC034 1035.2 mL 10 mL 1 uL PRIMARY
Analyte		Result (u	ig/L)	Qualifier	MDL	RL
Aldrin	The second state of the second second second second second second second second second second second second se	ND		strong countries and o	0.0029	0.0097
alpha-BHC		ND			0.0025	0.0097
beta-BHC		ND			0.0014	0.019
delta-BHC		ND			0.0029	0.0097
gamma-BHC (Lind	lane)	ND			0.0029	0.0097
4,4'-DDD		ND			0.0029	0.019
4,4'-DDE		ND			0.0011	0.019
4,4'-DDT		ND			0.0029	0.019
Dieldrin		ND			0.0029	0.019
Endosulfan I		ND			0.0029	0.019
Endosulfan II		ND			0.0029	0.019
Endosulfan sulfate	)	ŊD			0.0029	0.019
Endrin		ŊD			0.0029	0.019
Endrin aldehyde		ŊD			0.00097	0.048
Heptachlor		ND			0.0029	0.0097
Heptachlor epoxid	е	ND			0.0029	0.0097
Methoxychlor		ND			0.0029	0.097
Endrin ketone		ND			0.0029	0.019
Toxaphene		NÞ			0.26	0.97
alpha-Chlordane		NİÇ			0.0029	0.0097
gamma-Chlordane	9	NÔN			0.0011	0.0097 ¥
Surrogate		%Rec		Qualifier	the local disc second descent and state balls in the bull-ball state and a second	nce Limits
Tetrachloro-m-xyle		88	where a state of the second second second second		45 - 123	
DCB Decachlorob	iphenyl	102			33 - 133	

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Job Number: 580-51018-1

# Client: Ecology and Environment, Inc.

Client Sample ID:	15244122
Lab Sample ID:	580-51018-7
Client Matrix:	Water

Date Sampled: 06/17/2015 1535 Date Received: 06/20/2015 1045

8081B Organochlorine Pesticides (GC)						
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8081B 3510C 1.0 07/01/2015 0415 06/23/2015 1758	Analysis Batch: Prep Batch:	580-193563 580-193019	Initia Fina Injec	rument ID: al Weight/Volume: al Weight/Volume: ction Volume: ult Type:	TAC034 1052.4 mL 10 mL 1 uL PRIMARY
Analyte		Result (u	ıg/L)	Qualifier	MDL	RL , a
Aldrin alpha-BHC beta-BHC gamma-BHC (Lind 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin Endosulfan I Endosulfan I Endosulfan sulfate Endrin Endrin aldehyde Heptachlor Heptachlor Heptachlor Endrin ketone Toxaphene alpha-Chlordane gamma-Chlordane	e				0.0029 0.0025 0.0014 0.0029	0.0095 0.0095 0.019 0.0095 0.0095 0.019 0.0095 0.0
Surrogate		%Rec	7	Qualifier	Acceptar	ice Limits
Tetrachloro-m-xyl DCB Decachlorot		84 99	lar pa Alla - Lar (galana Panganana a	nene saje oten da norzkatorodzieka ten	45 - 123 33 - 133	namma fina diarran constructor mandra di Propusi con cara di Cr

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# Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID:	: 15244101					
Lab Sample ID: Client Matrix:	580-51018-10 Solid	% Moistur	e: 26.7			npled: 06/17/2015 0940 eived: 06/20/2015 1045
		8081B Organochi	orine Pesticide	es (GC)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8081B 3550B 1.0 07/21/2015 1904 06/30/2015 1442	Analysis Batch: Prep Batch:	580-195465 580-193641		ght/Volume: ght/Volume: /olume:	TAC034 10.473 g 10 mL 1 uL PRIMARY
Analyte	DryWt Correcte		ıg/Kg) G			RL
Aldrin		ND		-	.29	1.3
alpha-BHC beta-BHC		ND ND		-	.36 .42	1.3
delta-BHC				-	.42 .19	1.3
gamma-BHC (Lind	tane)	ND				1.3
4.4'-DDD		ND			.19	2.6
4,4'-DDE		ND		-	.18	2.6
4,4'-DDT		ND		C	.20	2.6
Dieldrin		ND		C	.15	2.6
Endosulfan I		ND		-	.13	1.3
Endosulfan II		ND			.22	2.6
Endosulfan sulfate	9	ND			.24	2.6
Endrin		ND			.21	2.6
Endrin aldehyde		ND			0.26 0.60	2.6
Heptachlor	lo	ND ND		-	0.0039	2.6 1.3
Heptachlor epoxid Methoxychlor	le	ND			.34	13
Endrin ketone		ND			.34	2.6
Toxaphene		ND			30 10	130
alpha-Chlordane		ND		-	0.17	1.3
gamma-Chlordane	e	NDMW			0.17	1.3 V
Surrogate		%Rec	C	Qualifier	Acceptar	ice Limits
Tetrachloro-m-xyle		54	and an and a second second second second second second second second second second second second second second	nalan kitan kitan kuta kuta talah satu tang dari	35 - 129	nder sindne frekkenen er biskerene baser munder frekanen umm Sommersenen eksen
DCB Decachlorob	iphenyl	67			60 - 128	

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## Client: Ecology and Environment, Inc.

Client Sample ID:	15244102					
Lab Sample ID: Client Matrix:	580-51018-11 Solid	% Moisture	e: 22.7			npled: 06/17/2015 1017 ceived: 06/20/2015 1045
		8081B Organochlo	orine Pestici	des (GC)		
Analysis Method:	8081B	Analysis Batch:	580-195465	instru	ment ID:	TAC034
Prep Method:	3550B	Prep Batch:	580-193641	Initial	Weight/Volume:	10.116 g
Dilution:	1.0				Weight/Volume:	10 mL
Analysis Date:	07/21/2015 2047			Inject	ion Volume:	1 uL
Prep Date:	06/30/2015 1442			Resu	t Type:	PRIMARY
Analyte	DryWt Corrected	d: Y Result (u	ıg/Kg)	Qualifier	MDL	RL
Aldrin	n an an a' the e-state and e-state and end of the state of the state of the state of the state of the state of t	ND		ana ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 199 Ng 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1999 ang 1	0.28	1.3
alpha-BHC		ND			0.35	1.3
beta-BHC		ND			0.41	1.3
delta-BHC		ND			0.19	1.3
gamma-BHC (Lind	lane)	ND			0.38	1.3
4,4'-DDD		ND			0.19	2.6
4,4'-DDE		ND			0.18	2.6
4,4'-DDT		ND			0.19	2.6
Dieldrin Endosulfan I		ND			0.15 0.13	2.6
Endosulfan II		ND ND			0.13	2.6
Endosulfan sulfate		ND			0.22	2.6
Endrin		ND			0.24	2.6
Endrin aldehyde		ND			0.25	2.6
Heptachlor		ND			0.59	2.6
Heptachlor epoxid	e	ND			0.0038	1.3
Methoxychlor		ND			0.33	13
Endrin ketone		NĎ			0.33	2.6
Toxaphene		NØ			29	130
alpha-Chlordane		ND			0.17	1.3
gamma-Chlordane	9	NØ	/		0.17	1.3
Surrogate		%Rec		Qualifier		nce Limits
Tetrachloro-m-xyle		52	na na manazir yang kanalar kana kana kana kana kana kana kana ka		35 - 129	the analysis of a state of the second s
DCB Decachlorob	iphenyl	66			60 - 128	

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# Client: Ecology and Environment, Inc.

Client Sample ID	15244103				
Lab Sample ID: Client Matrix:	580-51018-12 Solid	% Moisture: 57	.5		npled: 06/17/2015 1130 eived: 06/20/2015 1045
		8081B Organochlorine F	Pesticides (GC)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8081B 3550B 1.0 07/21/2015 2105 06/30/2015 1442	,	Final W	Veight/Volume: /eight/Volume: n Volume:	TAC034 10.476 g 10 mL 1 uL PRIMARY
Analyte Aldrin alpha-BHC beta-BHC delta-BHC gamma-BHC (Lind 4,4'-DDD 4,4'-DDT Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Heptachlor Heptachlor Heptachlor Endrin ketone Toxaphene alpha-Chlordane gamma-Chlordane	e	d: Y Result (ug/Kg) ND ND ND ND ND ND ND ND ND ND ND ND ND	Qualifier	MDL 0.44 0.54 0.64 0.29 0.29 0.28 0.30 0.23 0.20 0.34 0.36 0.32 0.39 0.91 0.0059 0.51 0.51 45 0.26 0.26 Xcceptar	RL 2.0 2.0 2.0 2.0 3.9 3.9 3.9 3.9 3.9 3.9 3.9 3.9
Tetrachloro-m-xyle DCB Decachlorob		43 86	n En den de van de service mensen op i beder de oemer kompole oer d	35 - 129 60 - 128	ng tin fill directed an an large time film of the of the office of the rest of the directed state of the

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## Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID:	15244104					
Lab Sample ID: Client Matrix:	580-51018-13 Solid	% Moisture	: 77.8			npled: 06/17/2015 1210 eived: 06/20/2015 1045
		8081B Organochlo	rine Pesticid	es (GC)		
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8081B 3550B 1.0 07/21/2015 2122 06/30/2015 1442	Analysis Batch: Prep Batch:	580-195465 580-193641	Final W	eight/Volume: eight/Volume: v Volume:	TAC034 10.159 g 10 mL 1 uL PRIMARY
Analyte Aldrin alpha-BHC beta-BHC gamma-BHC (Lind 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Heptachlor Heptachlor Heptachlor Endrin ketone Toxaphene alpha-Chlordane gamma-Chlordane	e	ed: Y Result (u ND ND ND ND ND ND ND ND ND ND ND ND ND	<u>/(Kg)</u>	Qualifier	MDL 0.98 1.2 1.4 0.65 1.3 0.65 0.62 0.67 0.52 0.45 0.76 0.82 0.72 0.87 2.1 0.013 1.1 1.1 100 0.59 0.59	RL 4.4 4.4 4.4 4.4 4.4 8.8 8.8 8.8 8.8 8.8
Surrogate Tetrachloro-m-xyle DCB Decachlorob		%Rec 52 66	ality waite institut 10% i 2 % waitationali	Qualifier	Acceptar 35 - 129 60 - 128	

MW 7-30

# Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID:	15244105				
Lab Sample ID: Client Matrix:	580-51018-14 Solid	% Moisture:	63.9		npled: 06/17/2015 1630 ceived: 06/20/2015 1045
		8081B Organochlorin	e Pesticides (GO	C)	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8081B 3550B 1.0 07/21/2015 2139 06/30/2015 1442		0-195465 0-193641	Instrument ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume: Result Type:	TAC034 10.357 g 10 mL 1 uL PRIMARY
Analyte	DryWt Correcte		g) Qualifie	er MDL	RL
Aldrin alpha-BHC beta-BHC gamma-BHC (Lind 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Heptachlor Heptachlor Heptachlor Endrin ketone Toxaphene alpha-Chlordane	2			0.59 0.74 0.87 0.40 0.80 0.39 0.38 0.41 0.32 0.27 0.46 0.49 0.44 0.53 1.2 0.0080 0.69 0.69 61 0.36	2.7 2.7 2.7 2.7 5.3 5.3 5.3 5.3 5.3 5.3 5.3 5.3
gamma-Chlordane	3	NOM	0.10	0.36	2.7
Surrogate Tetrachloro-m-xyl	energia teoretika kanatsiya atta amb taabbaa ala mininga DIDD	%Rec 51	Qualifi	er Acceptar 35 - 129	
DCB Decachlorob		67		60 - 128	

Client: Ecology and Environment, Inc.

#### Job Number: 580-51018-1

# Client Sample ID: 15244116

Lab Sample ID: 580-51018-1 Client Matrix: Water Date Sampled: 06/17/2015 1440 Date Received: 06/20/2015 1045

	8082A Poly	chlorinated Bipheny	ls (PCBs) by G	as Chrom	atography	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8082A 3510C 1.0 07/01/2015 0013 06/23/2015 1723	Analysis Batch: Prep Batch:	580-193656 580-193019	Initia Final Injec	ument ID: I Weight/Volume: Weight/Volume: tion Volume: ilt Type:	TAC034 975.5 mL 10 mL 1 uL PRIMARY
Analyte		Result (u	g/L) Q	ualifier	MDL	RL
PCB-1016	ale de la ferral de la décendration de la décendration de la décendration de la décendration de la décendration	ND	ىرى بەر يىلى سەرىپىدىنى بىلىغان بىلىغان بىلىغان بىلىغان بىلىغان سەرىپىيى بىل		0.017	0.51
PCB-1221		ND			0.030	0.51
PCB-1232		ND			0.015	0.51
PCB-1242		ND			0.014	0.51
PCB-1248		ND			0.014	0.51
PCB-1254		ND			0.015	0.51
PCB-1260		NOW			0.040	0.51 🖞
Surrogate		%Rec	Q	ualifier	Acceptan	ce Limits
DCB Decachlorob	iphenyl	104	and a state of a state of the s	and a first second second second second second second second second second second second second second second s	38 - 121	di ti foldilardo u debe continuo di strando e di Milando
Tetrachloro-m-xyle	ene	91			26 - 124	

Client: Ecology and Environment, Inc.

Client Sample ID:	15244117			
Lab Sample ID: Client Matrix:	580-51018-2 Water	Date Sampled: 06/17/2015 1510 Date Received: 06/20/2015 1045		
8082A Polychlorinated Biphenyls (PCBs) by Gas Chromatography				

	000ZA POIYCI	niorinated Bipneny	IS (PCBS) Dy	Gas Chr	omatograpny	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8082A 3510C 1.0 07/01/2015 0030 06/23/2015 1723	Analysis Batch: Prep Batch:	580-193656 580-193019	) ir F Ir	nstrument ID: nitial Weight/Volume: inal Weight/Volume: njection Volume: tesult Type:	TAC034 1020.8 mL 10 mL 1 uL PRIMARY
Analyte		Result (u	g/L)	Qualifier	MDL	RL r
PCB-1016	alanan sebarahan menandakan kenandar ang bara ang bara sebara sebaran bertakan kenandar sebara sebara sebara s	ŃD		an (19. albe) en sterningen er bei er sternigen	0.017	0.49
PCB-1221		ND			0.028	0.49 4
PCB-1232		ND			0.015	0.49
PCB-1242		ND			0.014	0.49
PCB-1248		ND			0.014	0.49
PCB-1254		ND			0.015	0.49
PCB-1260		NOPUN			0.038	0.49
Surrogate		%Rec		Qualifier	Acceptar	nce Limits
DCB Decachlorob	iphenyl	94	and a second fraction of the William Const.	Λ	38 - 121	dad Golddin Canolida ar Sonid Mandon Sonida Cananar a na anna 1974 a bhfar a chuirtean ann
Tetrachloro-m-xyle	ene	85			26 - 124	

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Client: Ecology and Environment, Inc.

Job Number: 580-51018-1

Client Sample ID:	15244118
Lab Sample ID:	580-51018-3

Lab Sample ID: 580-51 Client Matrix: Water Date Sampled: 06/17/2015 1600 Date Received: 06/20/2015 1045

	8082A Polych	lorinated Bipheny	ls (PCBs) by	Gas Ch	romatography	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8082A 3510C 1.0 07/01/2015 0048 06/23/2015 1723	Analysis Batch: Prep Batch:	580-193656 580-193019	) li F	nstrument ID: nitial Weight/Volume: inal Weight/Volume: njection Volume: Result Type:	TAC034 1051.2 mL 10 mL 1 uL PRIMARY
Analyte PCB-1016 PCB-1221 PCB-1232	de na dar we na Sartan kaj taun filo na na 150 na antar da na na da da na na	Result (u ND ND ND	g/L)	Qualifier	MDL 0.016 0.028 0.014	RL 0.48 0.48 0.48
PCB-1242 PCB-1248 PCB-1254 PCB-1260					0.013 0.013 0.014 0.037	0.48 0.48 0.48 0.48
Surrogate DCB Decachlorob Tetrachloro-m-xyle		%Rec 100 87	ng matang mangkan kanang sa sa sa s	Qualifier	Acceptar 38 - 121 26 - 124	nce Limits

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## Client: Ecology and Environment, Inc.

Client Sample ID:	15244119			
Lab Sample ID: Client Matrix:	580-51018-4 Water	Date Sampled: 06/17/2015 1515 Date Received: 06/20/2015 1045		
8082A Polychlorinated Biphenyls (PCBs) by Gas Chromatography				

	000ZA FOIYCIII	ormated Diprieny	IS (FCDS) by	Gas C	monialography	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8082A 3510C 1.0 07/01/2015 0105 06/23/2015 1723	Analysis Batch: Prep Batch:	580-193656 580-193019		Instrument ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume: Result Type:	TAC034 971.7 mL 10 mL 1 uL PRIMARY
Analyte		Result (u	g/L)	Qualifi	er MDL	RL ,
PCB-1016	et and all all all all all all all all all al	ND		1	0.017	0.51
PCB-1221		ND			0.030	0.51
PCB-1232		ND			0.015	0.51
PCB-1242		ND			0.014	0.51
PCB-1248		ND			0.014	0.51
PCB-1254		ND			0.015	0.51
PCB-1260		NON			0.040	0.51
Surrogate		%Rec		Qualifi	er Accepta	nce Limits
DCB Decachlorobiphenyl		102	n din dalah silan menjadi kang dalam menjadi kung	۸	38 - 121	الاستان المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع
Tetrachloro-m-xylene		83			26 - 124	

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## Client: Ecology and Environment, Inc.

Client Sample ID:	15244120	
Lab Sample ID: Client Matrix:	580-51018-5 Water	Date Sampled: 06/18/2015 1230 Date Received: 06/20/2015 1045
	8082A Polychlorinated Biphenyl	s (PCBs) by Gas Chromatography

	0002A POlycin	ormated Diplieny	is (PCDS) by	Gas Ci	nomatography	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8082A 3510C 1.0 07/01/2015 0122 06/23/2015 1723	Analysis Batch: Prep Batch:	580-193656 580-193019	Ð	Instrument ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume: Result Type:	TAC034 938.3 mL 10 mL 1 uL PRIMARY
Analyte		Result (u	a/L)	Qualifie	r MDL	RL 1
PCB-1016	alan oo ah ahaala oo ahalan ishaa daraa daraa daraa daraa daraa daraa daraa daraa daraa daraa daraa daraa daraa	ND		NAMES OF BRIDE STREET, N. 1997	0.018	0.53
PCB-1221		ND			0.031	0.53
PCB-1232		ND			0.016	0.53
PCB-1242		ND			0.015	0.53
PCB-1248		ND			0.015	0.53
PCB-1254		ND			0.016	0.53
PCB-1260		NDAW			0.042	0.53
Surrogate		%Rec		Qualifie	r Acceptar	nce Limits
DCB Decachlorobiphenyl		108		A 38 - 121		delargastanten och soch och dannataaft dura ergenten dura förs dyren och erallenet
Tetrachloro-m-xylene		88			26 - 124	

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# Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID:	15244121						
Lab Sample ID: Client Matrix:	580-51018-6 Water	Date Sampled: 06/17/2015 1440 Date Received: 06/20/2015 1045					
8082A Polychlorinated Biphenyls (PCBs) by Gas Chromatography							

	ooo zaar oiyo	morniated Diplicity	io (i 000) 03	000 011101	matography	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8082A 3510C 1.0 07/01/2015 0357 06/23/2015 1758	Analysis Batch: Prep Batch;	580-193656 580-193019	Initi Fin Inje	trument ID: ial Weight/Volume: al Weight/Volume: ection Volume: sult Type:	TAC034 1035.2 mL 10 mL 1 uL PRIMARY
Analyte		Result (u	ig/L)	Qualifier	MDL	RL ,
PCB-1016	ום לא היא איז איז איז איז איז איז איז איז איז א	ND	and a strength of the state of		0.016	0.48
PCB-1221		ND			0.028	0.48 1
PCB-1232		ND			0.014	0.48
PCB-1242		ND			0.014	0.48
PCB-1248		ND			0.014	0.48
PCB-1254		ND			0.014	0.48
PCB-1260		NOM			0.038	0.48
Surrogate		%Rec		Qualifier	Acceptar	ice Limits
DCB Decachlorobiphenyl				Α	38 - 121	
Tetrachloro-m-xylene		88			26 - 124	

MW 7-301

# Client: Ecology and Environment, Inc.

Client Sample ID:	15244122					
Lab Sample ID: Client Matrix:	580-51018-7 Water	Date Sampled: 06/17/2015 1535 Date Received: 06/20/2015 1045				
8082A Polychlorinated Binhenyls (PCBs) by Gas Chromatography						

	8082A Polyc	informated Bipneny	IS (PCBS) by	Gas Chro	matograpny	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8082A 3510C 1.0 07/01/2015 0415 06/23/2015 1758	Analysis Batch: Prep Batch:	580-193656 580-193019	) Initi Fin Inje	trument ID: ial Weight/Volume: al Weight/Volume: ection Volume: sult Type:	TAC034 1052.4 mL 10 mL 1 uL PRIMARY
Analyte		Result (u	ig/L)	Qualifier	MDL	RL
PCB-1016	n and a sub-transfer in the index of the state of the structure of	ND	an fan de ferste sen fan ferste		0.016	0.48
PCB-1221		ND			0.028	0.48 1
PCB-1232		ND			0.014	0.48
PCB-1242		ND			0.013	0.48
PCB-1248		ND			0.013	0.48
PCB-1254		NÞ ,			0.014	0.48
PCB-1260		NOW			0.037	0.48
Surrogate		%Rec		Qualifier	Acceptan	ice Limits
DCB Decachlorobiphenyl		105	alonda nalizione all'estenenari e dolle 2015 di prodi calleri di norme	٨	38 - 121	$\label{eq:states} \begin{split} & = 2 \cos(2\pi i \sqrt{2} \sin(2\pi i \cos(2\pi i \cos(2\pi i \cos(2\pi i \cos(2\pi i \cos(2\pi i \cos(2\pi i \cos$
Tetrachloro-m-xylene		84			26 - 124	

MW 7-30-15

# Client: Ecology and Environment, Inc.

# Job Number: 580-51018-1

Client Sample ID:	15244101				
Lab Sample ID: Client Matrix:	580-51018-10 Solid	% Moisture	e: 26.7		npled: 06/17/2015 0940 ceived: 06/20/2015 1045
	8082A Polyc	hlorinated Bipheny	ls (PCBs) by Gas	Chromatography	
Analysis Method: Prep Method: Dilution: Analysis Date: Prep Date:	8082A 3550B 1.0 07/02/2015 0307 06/30/2015 1442	Analysis Batch: Prep Batch:	580-193822 580-193641	Instrument ID: Initial Weight/Volume: Final Weight/Volume: Injection Volume: Result Type:	TAC045 10.473 g 10 mL 1 uL PRIMARY
Analyte	DryWt Correcte	d: Y Result (n	ng/Kg) Quali	fier MDL	RL
PCB-1016 PCB-1221 PCB-1232 PCB-1242 PCB-1248 PCB-1254 PCB-1260		ND ND ND ND ND ND ND ND ND ND ND ND ND	JQ	0.00065 0.0044 0.0029 0.0027 0.0021 0.0012 0.0017	0.013 0.014 0.014 0.013 0.014 0.013 0.013
Surrogate DCB Decachlorob Tetrachloro-m-xyle		%Rec 76 63		fier Acceptar 50 - 140 45 - 135	nce Limits

MW 22

#### Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244102 Lab Sample ID: 580-51018-11 Date Sampled: 06/17/2015 1017 Client Matrix: Solid % Moisture: 22.7 Date Received: 06/20/2015 1045 8082A Polychlorinated Biphenyls (PCBs) by Gas Chromatography Analysis Method: 8082A Analysis Batch: 580-193822 Instrument ID: TAC045 Prep Method: 3550B Prep Batch: 580-193641 Initial Weight/Volume: 10.116 g Dilution: 1.0 Final Weight/Volume: 10 mL 07/02/2015 0357 Analysis Date: Injection Volume: 1 uL Result Type: 06/30/2015 1442 PRIMARY Prep Date: DryWt Corrected: Y Result (mg/Kg) RL Analyte Qualifier MDL PCB-1016 ND 0.00064 0.013 PCB-1221 0.0043 0.014 0.014 PCB-1232 0.0028 PCB-1242 0.0027 0.013 Nþ PCB-1248 0.014 0.0020 PCB-1254 NФ 0.0012 0.013 NOM PCB-1260 0.0017 0.013 an %Rec Qualifier Surrogate Acceptance Limits

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(MW-7-301

07/27/2015

DCB Decachlorobiphenyl

Tetrachloro-m-xylene

Job Number: 580-51018-1

50 - 140

45 - 135

Job Number: 580-51018-1

#### Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244103 Lab Sample ID: Date Sampled: 06/17/2015 1130 580-51018-12 **Client Matrix:** Solid % Moisture: 51.5 Date Received: 06/20/2015 1045 8082A Polychlorinated Biphenyls (PCBs) by Gas Chromatography 8082A Analysis Method: Analysis Batch: 580-193822 Instrument ID: TAC045 Prep Method: 3550B Prep Batch: 580-193641 Initial Weight/Volume: 10.476 g Dilution: 1.0 Final Weight/Volume: 10 mL Analysis Date: 07/02/2015 0414 Injection Volume: 1 uL Prep Date: 06/30/2015 1442 Result Type: PRIMARY Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier RL MDL 0.020 PCB-1016 ND 0.00098 PCB-1221 ΝD 0.0067 0.022 PCB-1232 0.022 0.0043 PCB-1242 0.0041 0.020 PCB-1248 ND 0.022 0.0031 PCB-1254 ND 0.0018 0.020 PCB-1260 NOM 0.0026 0.020 un Surrogate %Rec Qualifier Acceptance Limits DCB Decachlorobiphenyl 78 50 - 140 45 - 135 Tetrachloro-m-xylene 64

MWZZC 07/27/2015

Job Number: 580-51018-1

45 - 135

#### Client: Ecology and Environment, Inc.

#### **Client Sample ID:** 15244104 Lab Sample ID: 580-51018-13 Date Sampled: 06/17/2015 1210 **Client Matrix:** Solid % Moisture: 77.8 Date Received: 06/20/2015 1045 8082A Polychlorinated Biphenyls (PCBs) by Gas Chromatography Analysis Method: 8082A Analysis Batch: 580-193822 Instrument ID: TAC045 3550B Prep Method: Prep Batch: 580-193641 Initial Weight/Volume: 10.159 g Dilution: 1.0 Final Weight/Volume: 10 mL Analysis Date: 07/02/2015 0431 Injection Volume: 1 uL 06/30/2015 1442 Prep Date: Result Type: PRIMARY Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier MDL RL PCB-1016 ND 0.0022 0.044 PCB-1221 0.015 0.049 PCB-1232 0.049 0.0097 PCB-1242 0.0093 0.044 ND PCB-1248 0.049 0.0071 PCB-1254 Nb 0.0040 0.044 ифМ. PCB-1260 0.0058 0.044 MW Surrogate %Rec Qualifier Acceptance Limits 50 - 140 DCB Decachlorobiphenyl 70

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07/27/2015

Tetrachloro-m-xylene

Job Number: 580-51018-1

45 - 135

#### Client: Ecology and Environment, Inc.

#### Client Sample ID: 15244105 Lab Sample ID: 580-51018-14 Date Sampled: 06/17/2015 1630 Client Matrix: Solid % Moisture: 63.9 Date Received: 06/20/2015 1045 8082A Polychlorinated Biphenyls (PCBs) by Gas Chromatography Analysis Method: 8082A Analysis Batch: 580-193822 Instrument ID: **TAC045** Prep Method: 3550B Prep Batch: 580-193641 Initial Weight/Volume: 10.357 g Dilution: 1.0 Final Weight/Volume: 10 mL Analysis Date: 07/02/2015 0447 Injection Volume: 1 uL Prep Date: 06/30/2015 1442 Result Type: PRIMARY Analyte DryWt Corrected: Y Result (mg/Kg) Qualifier RL MDL PCB-1016 ND 0.0013 0.027 PCB-1221 0.0091 0.029 PCB-1232 0.0059 0.029 PCB-1242 0.027 0.0056 PCB-1248 ND 0.0043 0.029 PCB-1254 ND 0.0024 0.027 PCB-1260 NÔW 0.0035 0.027 Smil Surrogate %Rec Qualifier Acceptance Limits DCB Decachlorobiphenyl 50 - 140 67

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MW 7-30-

07/27/2015

Tetrachloro-m-xylene